the OIL AND GAS JOURNAL

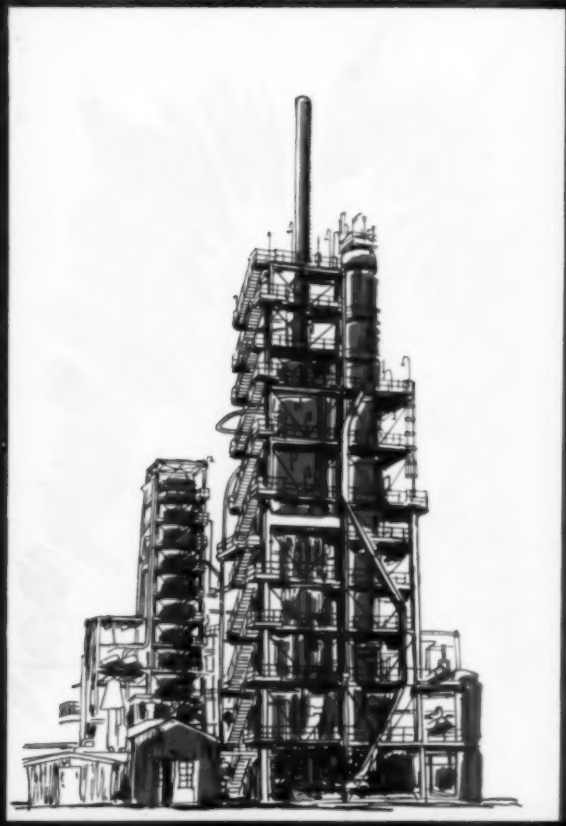
MARCH 24, 1958

★★★★

47-PAGE REPORT ON

Crude Evaluation

p. 109



Bright Spots Appearing In Oversupply Picture

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The Journal's

Refining Forecast

A feature of the . . . p. 88

Annual Refining Number

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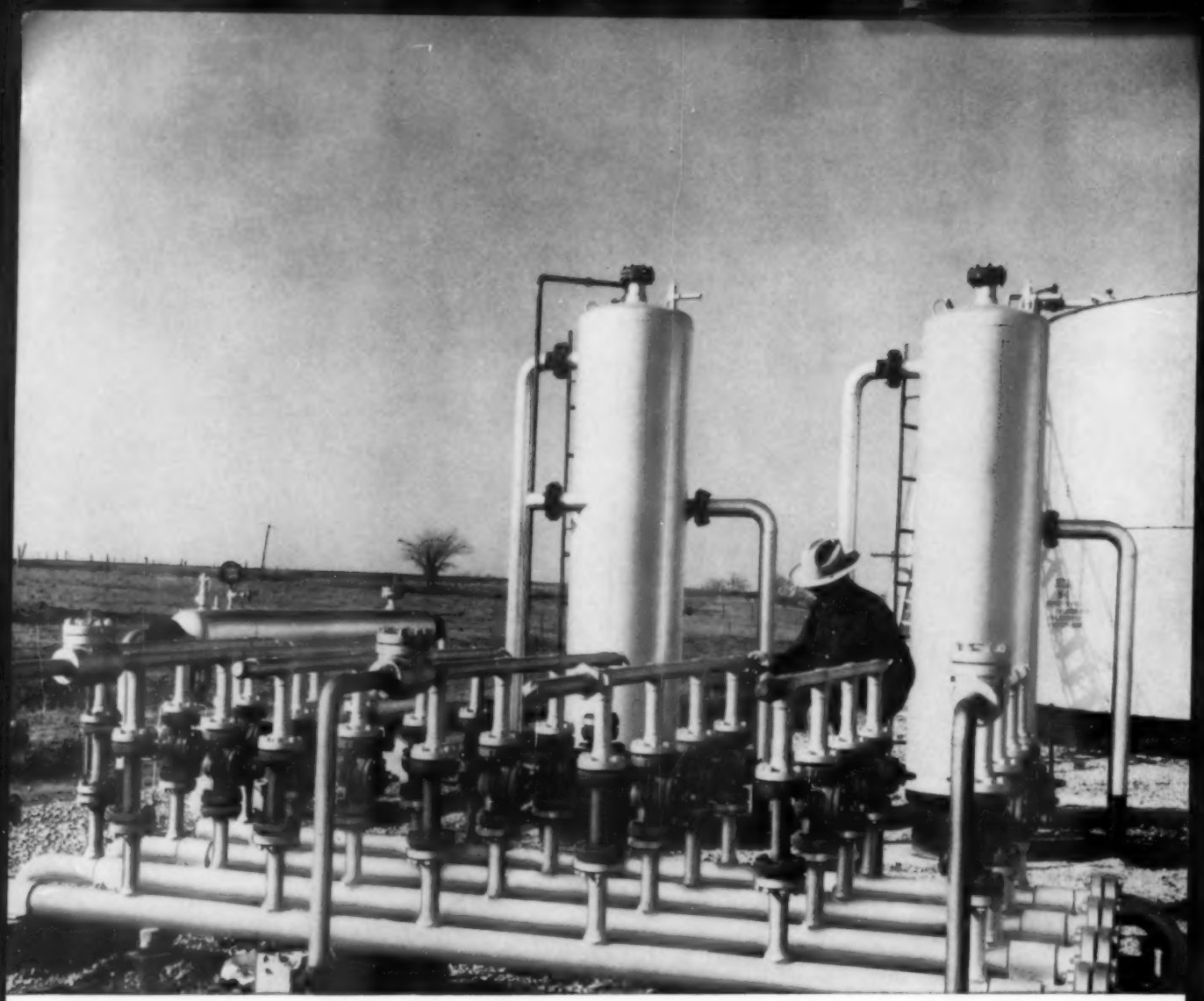

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the OIL AND GAS JOURNAL Newsletter

Tulsa, Okla.
March 24, 1958

Signs are growing that oil is riding out the storm well:

Latest indices show the oil industry generally is faring better than average.

But more important, more analysts now feel that business may be nearing bottom of the dip. Some improvements should start showing up in the next few months. That would give aid to oil men now working hard to put balance into their business.

One danger now: Development of a fear psychosis which would completely change business and consumer buying habits.

Here's the situation revealed in latest surveys:

Wall Street: Betting seems to be on an upturn. Stocks are firmer. The issues of natural-gas pipelines are 14 per cent higher than their 1957 lows. Securities of crude-oil producers stand 1 per cent higher. Although oil shares are softer than most, their trend still is up.

Industrial output: The Federal Reserve Board production index is down 12 per cent from December to February, sharpest postwar drop.

Petroleum-chemical group however, is only off 2 per cent. Oil and natural gas down 7 per cent.

More specifically, refineries currently are running at 82 per cent of rated capacity, but they never run at full tilt. Steel, by comparison, is running at 52.8 per cent of capacity.

Crude production is 81 per cent of first quarter 1957, a recent high point.

And rotary rigs working are 64.7 per cent of the 1956 average when a record number of wells was completed. Only 1,694 rigs were busy last week, for a recent low mark. This should improve, however. The first quarter normally is lower than the year's average.

Outlook in next 2 or 3 months is for continued low-level production both at the well and in the plant.

Capital investment: For business as a whole, expenditures for new plant and equipment will drop 13 per cent in 1958.

SEC report says the decline in petroleum will be 10 per cent—from $3.4 billion last year to $3.1 billion this year.

Markets: Total oil demand is running slightly above last year. Recent cold weather has vastly improved demand for middle distillates, residuals, and LPG. Their stock positions as a result are much improved.

The same cold weather cut gasoline demand, sent stocks higher. This may grow worse in next few weeks especially if bad weather continues until mid-April as predicted. But the gasoline season will start after that, and with a little luck in weather and a good tourist season the stocks should drop. A good early gasoline season will give the industry a big lift (p. 85).

Government action: What Washington will do to boost the economy is still a big guess. Consensus is that a tax cut and increased spending in public works are coming. Stiffer action of some sort on imports also is predicted. But these moves, if they develop, won't help oil until late in the year.

People's buying habits: Americans are saving more, buying less. Survey made for Federal Reserve Board shows people plan to buy fewer new cars, houses, appliances. If this trend could be changed, it would end the recession. Oil companies have a stake in rebuilding buyer confidence.

What to do now: Management is being advised to take steps now to put their businesses in a position to ride the upswing. This means:

Keeping inventories up, especially steel items. They may be hard to get when everyone again wants steel.

Reexamining cash position. Interest rates are lower. It may be a good time to change financing plans.

Watching personnel. You might pick up some first-rate talent at a bargain. Remember how hard it was to get engineers only a few months ago. This could return just as quickly.

Keeping equipment in top shape. It should be ready to go to work again quickly.

Cultivating the customer. He's more important now than ever and he'll be just as important when times get better.

Threat of bankruptcy still hangs over Colorado Interstate Gas Co. Its customers have refused to accept a $24-million refund in settlement of rate cases (p. 101).

Instead, the gas-distributing firms and officials of cities served by Colorado Interstate propose a $40-million refund. FPC had suggested a $33-million rebate.

Colorado Interstate management insists even the $33-million refund would force the company into bankruptcy.

U. S. refinery expansion is slowing down, latest Journal survey shows.

This is regarded as a favorable sign in view of present spread between capacity and demand.

The picture in refinery building last year: Crude capacity rose 1.2 per cent to 9,130,000 bbl. daily. Hydrogen treating capacity rose 49 per cent, catalytic reforming 23 per cent. Cat cracking shows signs of approaching saturation, and thermal cracking continues to dwindle.

Canadian capacity, meanwhile, rose 10 per cent and will climb still more through 1960. The heavy plant concentration in eastern Canada could mean trouble ahead if demand fails to live up to expectations (p. 88).

Kuwait has become a major Middle East refiner.

It has added 160,000 bbl. daily capacity to its little 30,000-bbl. daily refinery in one swoop. Main product will be Bunker C fuel, but straightrun gasoline also will be put on the world market. Some already is entering the U. S.

In addition, a Kuwait Oil expansion program involving more terminal facilities, pipelines, and new drilling could jump the country's production to 2½ million barrels daily by next year (p. 106).

Ethyl expects to have its new AK-33X antiknock additive available by 1960.

Researchers are much encouraged with results from this manganese additive. It was first introduced for experimental evaluation last summer. Industry is hearing more about it at refinery gatherings this spring.

Carson has given support to inside reports in Washington that the administration will stay within the framework of voluntary controls in dealing with the imports issue.

Speaking at Abilene, Tex., last week, the imports boss indicated reductions in imports may come. But at the same time he said:

...Voluntary program is working.

...Imports have not mounted steadily.

...Present economic troubles of oil can't be blamed entirely on imports. Other business is suffering too.

Bright spot in domestic exploration is Rocky Mountains.

Rig activity sticks close to 200, up over first 2 months of last year. Completions also are up. The wildcat-success ratio is better.

Prolific Paradox basin of Utah is partly responsible for this excellent showing for the region. Utah has 42 rigs busy. By mid-March 67 field wells had been completed in San Juan County plus 10 wildcat completions. The activity provided important extensions at Bluff and McElmo Creek fields.

Important fact: Majority of wells completed in the county

made more than 1,000 bbl. daily.

A wildcat program is building up north and west of Aneth in an area 42 miles long and 12 miles wide.

Socal and Gulf will stake $3 million on a deep-water test in remote region of the Caribbean.

Zapata Off-Shore's three-legged rig, Scorpion, will do the drilling. Site is on the Cay Sal Bank, roughly 40 miles northeast of Cardenas on Cuba's north coast and 187 miles southwest of Nassau (p. 108).

Stepped-up drilling in Australia is the aim of a government offer to pay half the cost of four deep wells to be drilled on mainland this year.

Government also plans to drill five shallow stratigraphic holes at its own expense this year in western Australia.

Drilling crews who've worked on power rigs equipped with a runaround are enthusiastic about it. They say the addition gives the rig a steam-drive feel (p. 208).

The runaround is a fluid coupling which bypasses the master clutch. Amount of oil in the coupling can be controlled so that power output can be determined to a fine point.

Thus the drive limits torque on the rotary and pull on the sand line. What's more, it is simple, rugged, foolproof, and it operates with finger-tip control.

Synthetic rubber, mostly a petroleum product, will face tough sledding trying to expand its share of U. S. market.

Synthetics now hold nearly two-thirds of domestic market with natural rubber taking the rest.

Prediction now is that new cultivation practices will allow natural to sell for as low as 10 cents a pound. This compares with today's prices of 26 cents for natural and 24 for synthetics.

Oil-company profits are holding up surprisingly well in reports on 1957 business.

Wall Streeters put decline in petroleum product firms at less than 2 per cent, a much better showing than many other industries. It reflects oil's stepped up activity during Suez crisis and firm prices in first half of last year.

Latest profit reports: Argo up to $4.9 million from $4.5 million; Cities Service down to $59.1 million from $62.1 million; Honolulu Oil up to $14.5 million from $13.8 million; Midwest Oil up to $6.7 million from $6.5 million; Southland Royalty up to $4.2 from $3.3 million; Texas Pacific Coal & Oil up to $7.23 million from $7.20 million; Universal Consolidated Oil up to $3.56 million from $3.35 million; White Eagle Oil down to $150,002 from $168,080.

Good Wells Make Good News

A Monthly Report Of Successful Well Treatments

March 24, 1958

For sustained production increases from many formations, fracturing is often recommended over any other stimulating technique. "Frac" sand provides a permanent propping action in formation fractures — to improve the drainage characteristics of the well. Here are some recent examples of what has been achieved with Dowell fracturing services.

- **Reagan County, West Texas.** (Old well) Production from this Spraberry well had declined to 15 bopd. Dowell recommended fracturing with Petrojel* to increase production. Treatment was performed using 60,000 gallons jelled crude and 90,000 pounds sand. Because the well was producing from three sets of perforations — 6583 to 6607, 7436 to 7460 and 7486 to 7492 — 275 ball sealers were used during treatment. Injection rate averaged 53 bpm at 1600 psi. *Well tested 100 bopd 33 days after treatment.*

- **Beaver County, Oklahoma.** (New gas well) This well was completed through perforations in the Hoover formation (4450 to 4484 feet). Duofrac* was recommended as the best fracturing service to bring in this well. Dowell fractured using 30,000 gallons three per cent acid carrying 1 pound sand per gallon. In this case a surface tension reducing agent and FLA* (Fluid Loss Additive) were also used. Injection rate averaged 55 bpm down casing. *Production increased from a show to 40 mmcfd.*

- **Hamilton County, Illinois.** (New well) Petrojel was used to fracture this well drilled in the Aux Vases. Casing was set and perforated from 3118 to 3148 feet, four shots per foot. Dowell fractured with 15,000 gallons jelled crude and 15,000 pounds sand at an average injection rate of 31 bpm. 35 ball sealers were injected midway through the treatment. *Well flowed 2030 barrels of oil during the first 20 hours it was opened, and levelled off at 1437 bopd after it cleaned up.*

- **San Juan County, New Mexico.** (New well) Completed in Mancos sand through perforations, 1130 to 1182 feet and 1222 to 1285 feet, this well tested 20 boph. Because of thick pay section, operator wanted to fracture and retest. Dowell recommended Sandfrac*, using 65,000 gallons lease crude and 65,000 pounds sand. Injection down 5½-inch casing averaged 76 bpm. 150 ball sealers were injected behind first 30,000 gallons fluid to divert remaining fluid into less permeable zones. After treatment, *well flowed 120 boph on a prolonged test.*

Dowell offers nine basic fracturing services and an infinite variety of modifications to meet the specific requirements of any well. For more information or service, call any of the 165 Dowell offices in the United States and Canada; in Venezuela, contact United Oilwell Service, or write Dowell Incorporated, Tulsa 1, Oklahoma.

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The Oil and Gas Journal, published Mondays, copyright 1958, by The Petroleum Publishing Co. Entered as second-class matter September 1, 1910, at post office at Tulsa, Okla., under act of March 3, 1879. United States and foreign rates to the petroleum industry, 1 year $5, 2 years $8, 3 years $10.

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SPECIAL REFINING SECTION

Refining Capacity Growth Slows Down 88

By George Weber

Crude capacity rose only 1.2% in 1957. And in view of the top-heavy position of potential over demand, this is regarded as a favorable trend. New crude capacity is being added but most of it is offset by a rising retirement rate for older facilities.

Refiners are continuing a fairly heavy investment in processing designed to upgrade product quality. Hydrogen treating showed a 49% increase in 1957 and catalytic reforming moved up 23%. Catalytic cracking is showing signs of approaching saturation and thermal cracking continues to dwindle.

During 1958 the trend toward upgrading processing facilities will continue at a fairly rapid pace.

Selected Crude-Evaluation Charts 110-156

Here are crude-evaluation charts and tables of data for 47 selected crudes, both domestic and world-wide. The chosen crudes are either representative tanker or pipeline mixes or come from prolific fields which can supply large amounts of crudes.

There are 20 domestic crudes selected from various parts of Texas, Oklahoma, Mid-Continent, Williston basin, Rocky Mountains, and West Coast. The four Canadian crudes are typical of those in Alberta and Saskatchewan. There are nine Venezuelan crudes, eight from the Middle East, two from Europe, one from Africa, and three from the Far East.

Annual Survey of Capacities of Operating Refineries 159

The Journal's annual survey of operating refineries shows that United States' capacities were boosted to more than 9,700,000 bbl. per stream day by January 1, 1958. All figures in the capacity tables are of this date. Additions during 1958 and later can be made to the basic table by consulting the new construction table.

Other capacities for United States refineries are: (1) vacuum distillation, 2,841,000; (2) thermal operations, 2,202,000; (3) catalytic cracking, 4,246,000; (4) catalytic reforming, 1,528,000; (5) hydrogen treating, 1,341,000; (6) alkylation, 310,000; (7) polymerization, 149,000; (8) lubes, 186,000; and (9) asphalt, 461,000 bbl. per day. Coke capacity is 14,400 tons per day.

Canadian Operating Refineries 197

Crude capacities for Canadian plants jumped from 750,000 bbl. per day as of January 1, 1957, to 823,000 as of January 1, 1958. Other capacities include: (1) vacuum distillation, 296,000; (2) thermal operations, 119,000; (3) catalytic cracking, 361,000; (4) catalytic reforming, 127,000; (5) hydrogen treating, 59,000; (6) alkylation, 2,230; (7) polymerization, 31,000; (8) lubes, 4,750; and (9) asphalt, 49,000 bbl. per day. Coke capacity is 329 tons per day.

Survey of New Refinery Construction 200

New construction money in 1958 will largely be spent on processing designed to increase product quality. The spending will be about the same as last year but there will be very little increase in crude-running capacities.

Shutdown Plants in the United States 206

TECHNOLOGY—OPERATION

Runaround Gives Soft Drive to the Rotary on a Power Rig 208

By Ed McGhee

It's a fluid coupling which bypasses the master clutch. Amount of oil in the coupling can be varied carefully so that power output can be controlled to a fine point. It is simple and rugged and operates with finger-tip control.

Process Costimating 211

On The Job . . . Pipelining: Meter Proving—3 213

By M. L. Barrett, Jr.

This closing part of a three-part series covers the vapor-displacement prover, the water-displacement prover, the vapor-condensing prover, and the free-piston-displacement prover.

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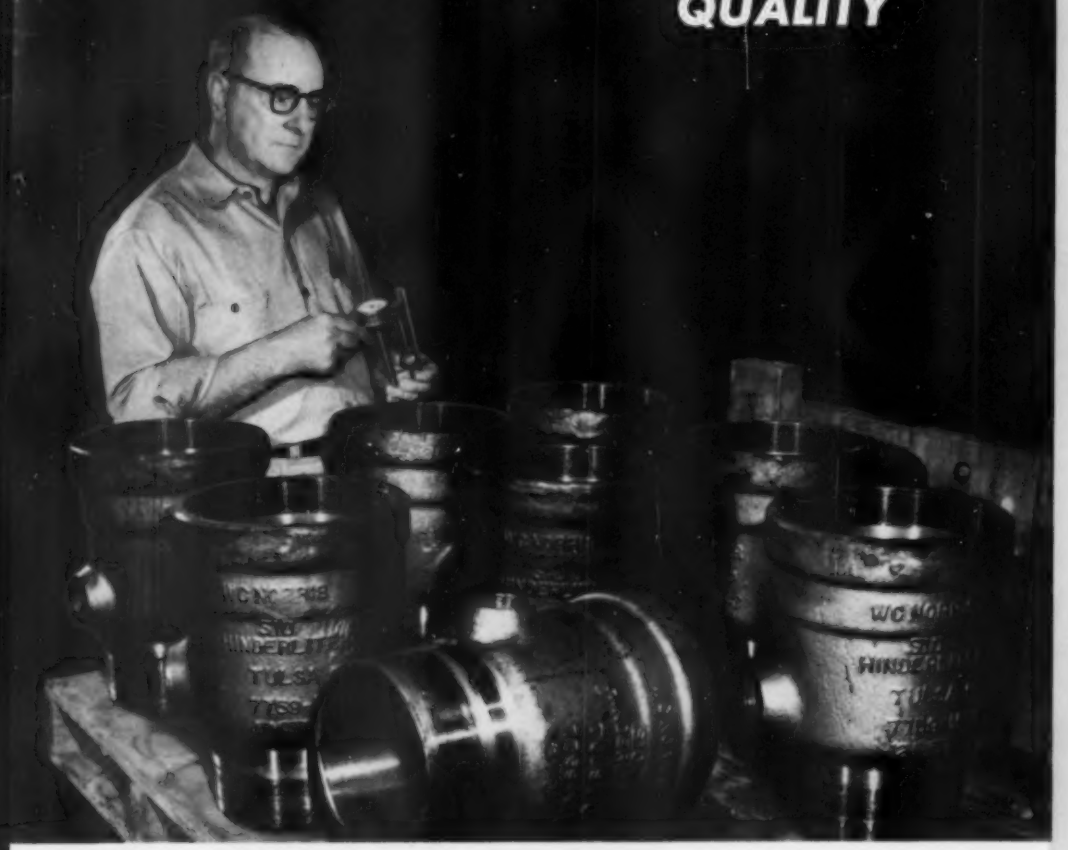

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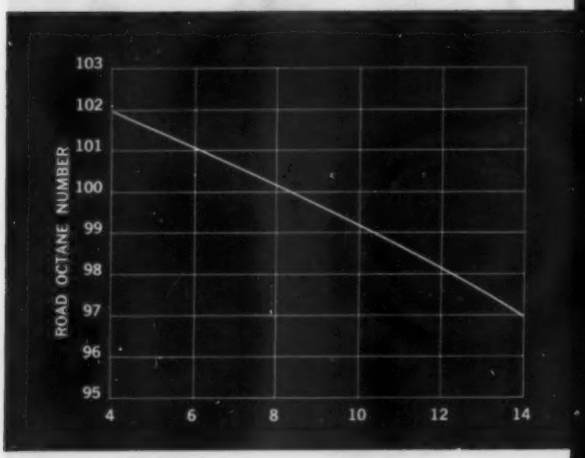
SENSITIVITY AFFECTS ROAD OCTANE NUMBER

ALL GASOLINES 100 RES. O. N.

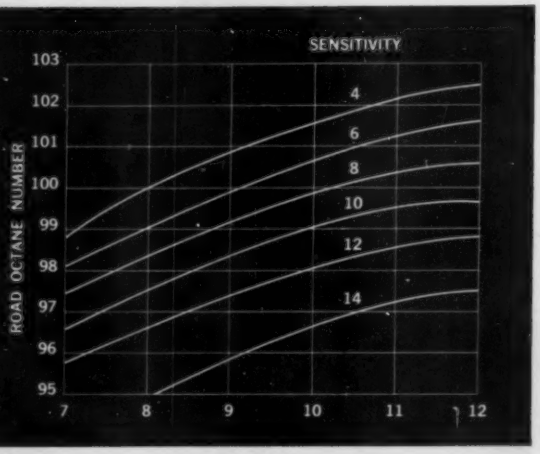


SENSITIVITY = RES. O. N. MINUS MOTOR O. N.

FIGURE 1

EFFECTS OF SENSITIVITY VARY WITH COMPRESSION RATIO

ALL GASOLINES 100 RES. O. N.



COMPRESSION RATIO

FIGURE 2

Sensitivity has new importance in relation to gasoline quality

BY KENT HYATT

Today these old and familiar terms of "sensitivity" and "road depreciation" have new significance for petroleum refiners. This is because advanced automatic transmission designs, changes in axle ratios and improved carburetion and fuel induction have increased the importance of motor method octane quality in determining the road performance of a gasoline.

To refiners this greater importance of motor method octane ratings and sensitivity means additional complications in blending gasoline stocks for optimum road performance and maximum processing economies.

One aspect of sensitivity which refiners must consider is illustrated in Figure 1. Here is shown a series of gasolines all at 100 research octane level. The road octane number of these gasolines decreases from 101 to 97 when the sensitivity is varied from 6 to 14. A further illustration of the effect of sensitivity is illustrated in Figure 2. Here again is a series of gasolines of 100 research octane number. It is apparent that for a given sensitivity, the road octane number is raised with an increase in compression ratio. And as in Figure 1, at a given compression ratio, the road octane number increases as the sensitivity is reduced.

In the near future we will try to illustrate how predicted compression ratio trends and related octane requirements as a function of sensitivity, are used in predicting gasoline quality requirements. E. I. du Pont de Nemours & Co. (Inc.), Petroleum Chemicals Division, Wilmington 98, Delaware.

KENT HYATT is supervisor of the road and electronics group in the engineering division of the main Du Pont Petroleum Laboratory. He is in charge of the sensitivity investigation described above.

See the "DU PONT SHOW OF THE MONTH" on CBS

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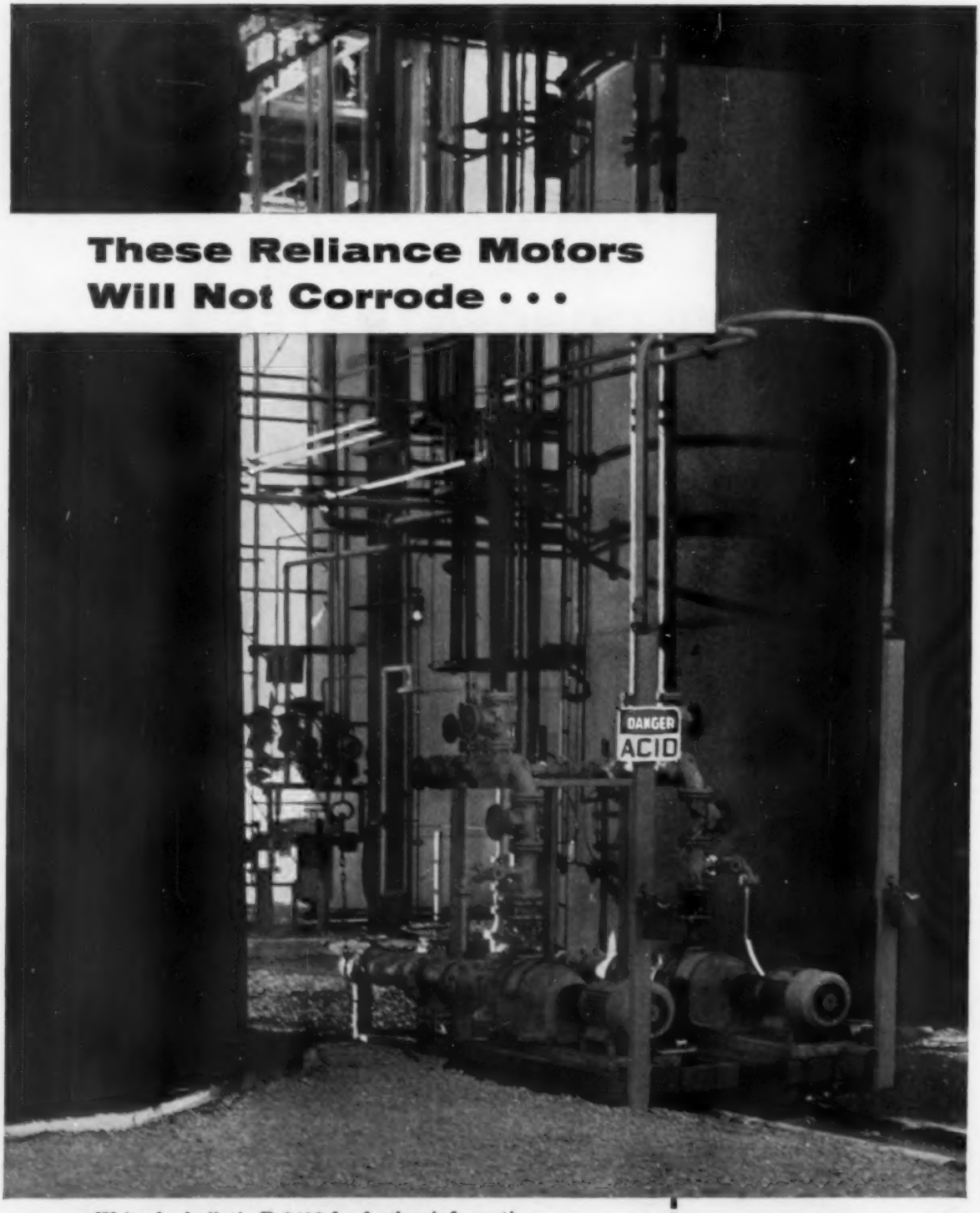

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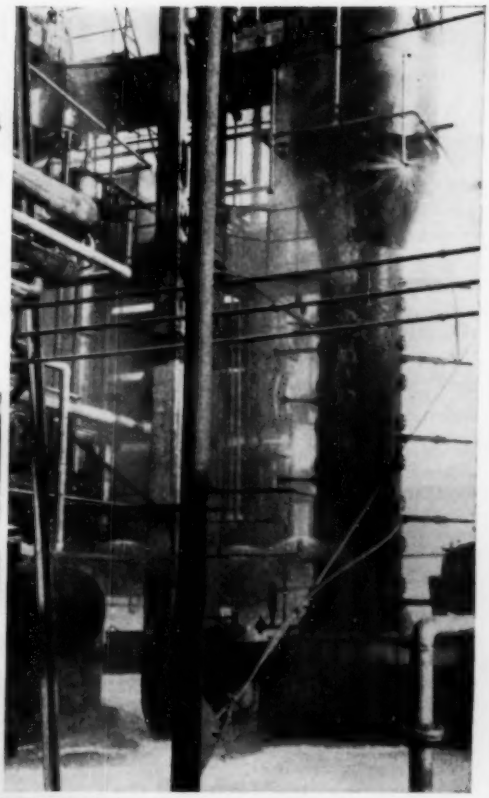
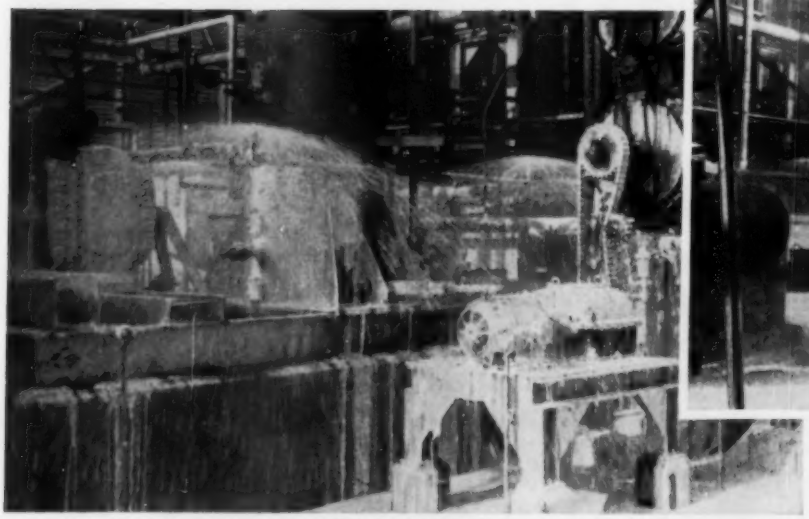
B-1072

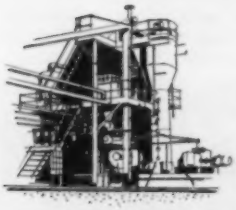
Tough Fire Protection Problem Solved by GRINNELL



▲ Grinnell ProtectoSpray on upper part of unit cools equipment and washes burning oil and solvent into area protected by foam blanket below.



▲ Grinnell ProtectoFoam safeguards the lower section of hexane solvent extraction unit with a blanket of foam, to prevent formation of explosive mixtures.



At Canadian Vegetable Oil Processing Ltd., Hamilton, Ontario, hexane solvent is used in extracting vegetable oil from soybeans. Because of the highly flammable nature of the solvent, Grinnell designed a special system for this unit, consisting of 162 ProtectoSpray nozzles — to drench the superstructure with fine water spray; and 24 ProtectoFoam spray heads — to blanket the diked area with foam. This water-foam combination protects the lives of personnel, as well as shielding equipment from costly damage.

Solving tough fire problems like this with installations engineered to the hazard, tailored to the need, built of highest quality materials is something Grinnell has been doing successfully for more than 85 years. Check the list below for the Grinnell System suited to your requirements. Or, tell us about the fire hazard you face, and let us suggest the proper installation for you. Grinnell Company, Inc., 277 West Exchange Street, Providence, Rhode Island.

Grinnell Fire Protection Systems include:

- Automatic spray sprinklers — wet pipe, dry pipe, Simplex, and deluge systems
- Emulsion and vapor dilution extinguishment with water sprays — Mulsifyre and ProtectoSpray systems
- Cooling, insulation and controlled burning with water sprays — ProtectoSpray systems
- Mechanical foam blanket — ProtectoFoam systems
- Carbon dioxide systems
- Dry chemical systems

Manufacturing, Engineering, and Installation of Fire Protection Systems since 1870

BRIDGEPORT BRASS

COPPER ALLOY BULLETIN

CONDENSER AND HEAT EXCHANGER TUBE EDITION

Advantages of Duplex Tube

by C. L. BULOW
Chief Corrosion Metallurgist
Bridgeport Brass Company

Bridgeport Duplex Tubes are used where a heat exchanger tube is attacked simultaneously inside and out by different types of corrosive media. Duplex is made by drawing two tubes of different metals, one over the other, and combining them into a single tube.

Metal Combinations

This type of construction permits the use of a wide range of combinations of metals—Admiralty, Cupro Nickel, Copper, Aluminum Brass, and many others coupled with steel, nickel, aluminum, stainless steel, Monel, etc.

Many Uses

Applications for Bridgeport Duplex Tubes include successful service in the production of ammonia, benzol, hydrocarbons, resins, rubber chemicals, carbon dioxide and many other chemicals. Likewise, duplex tubes are admirably suited for replacement of ordinary boiler tubes for use in air-compressor aftercoolers, lube-oil coolers and fuel-oil heaters.

Applying Duplex Tubes

It is virtually impossible to prescribe what duplex tube combination is best for any specific use without information on the specific requirements of the application. The important point to remember is that with duplex tubes you can practically "tailor" the tube to your requirements.

Laminated Tube Sheets—Another Weapon In The Fight Against Dual Corrosion

Bridgeport now offers metallurgically bonded dual-metal tube sheets especially designed to combat dual corrosion. These tube sheets are a valuable adjunct to duplex and copper and copper-alloy condenser and heat exchanger tubes. They are available in a number of combinations such as Naval Brass, Muntz Metal, silicon bronze, copper, and Monel with steel and stainless steel.

Heavy-wall duplex consists of a thin wall of copper or other nonferrous metal around a thick-walled steel tube—a perfect combination for high pressures and utmost corrosion resistance.

New Bridgeport Heavy-Wall Duplex Tubes Lick Dual Corrosion Problems at High Pressures

High-pressure heat exchanger operation presents two very basic problems. The first is to find a tube thick enough to stand up under the pressures used. The second is to find a tube material able to withstand corrosive attack for long periods of time and at the same time provide desired heat-transfer characteristics.

New Heavy-Wall Duplex

Bridgeport came up with the answer in a new design—heavy-wall duplex tube. Heavy-wall duplex consists of a heavy inner tube with an outside covering of thin-wall nonferrous tubing. Although the inner tube is low carbon or stainless steel, and the outer tube Cupro Nickel, Red Brass, Admiralty or copper, both inner and outer tube materials can be varied to suit the conditions of the application.

Advantages

Use of a nonferrous outer tube cuts corrosive effects of cooling water. And, because it resists corrosion, it gives the entire tube installation superior heat-transfer characteristics. With proper cleaning and maintenance, a Bridgeport Heavy-Wall Duplex Tube will substantially outperform single metal tubes.

Installation

Most applications are in cascade coolers where bent tube ends are required. Small sections of heavy-wall duplex can be formed to the desired radius or one end of long sections can be bent, thereby eliminating one weld joint.

Heavy-wall duplex tubes are designed to the ASME Code to operate at pressures up to 5,000 psi. They will, however, pass hydrostatic tests at much higher pressures. In actual operation they will give years of satisfactory trouble-free service with no more than normal cleaning and maintenance procedures.

To make hairpin turns, sections of heavy-wall duplex are bent and welded to straight lengths or other bent sections.

Further Information

More detailed information on sizes, characteristics and ratings of Bridgeport Heavy-Wall Duplex Tubes will be furnished on request. Our Technical Service representatives are also available to cooperate with you in working out application problems. For prompt service, call your nearest Bridgeport Sales Office.

BRIDGEPORT BRASS

Bridgeport Brass Company, Bridgeport 2, Connecticut • Offices in Principal Cities
In Canada: Noranda Copper and Brass Limited, Montreal

P&H 255A

flexibility and strength

to take on any job!

The rugged, amazingly versatile 255A is big enough to handle most lifting, materials handling and digging jobs around the refinery, plant yard, pipeline and drill site. Yet it is small enough to operate profitably in close quarters and move quickly from job to job. These features explain its standout performance:

- **Triple safe planetary boom hoist for precision lowering of boom under power**
- **True tractor-type crawlers for greater mobility—easier maintenance**
- **P&H hydraulic controls for smooth, precise operation**
- **"Live roller circle" for smoothest, fastest swings known**

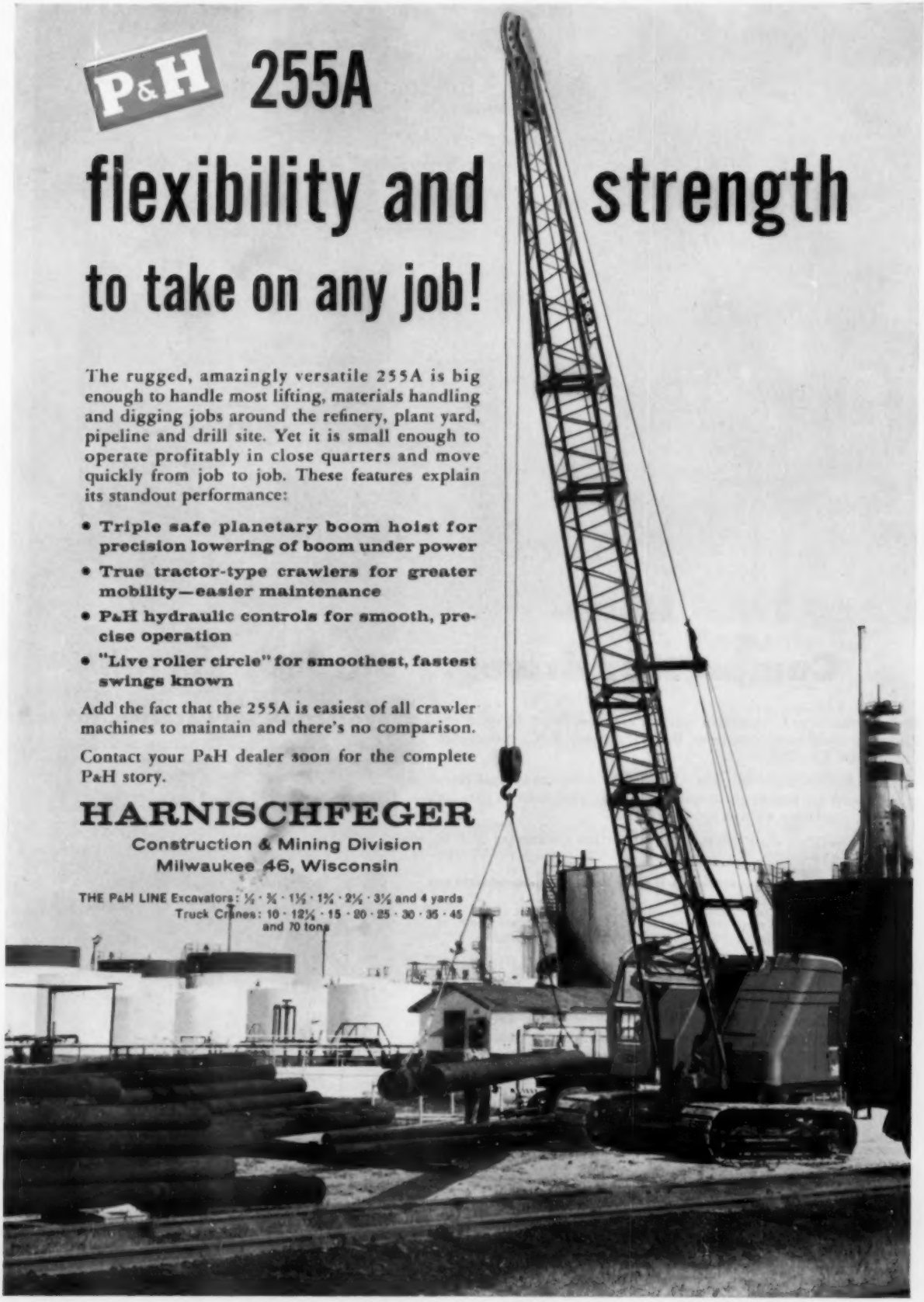
Add the fact that the 255A is easiest of all crawler machines to maintain and there's no comparison.

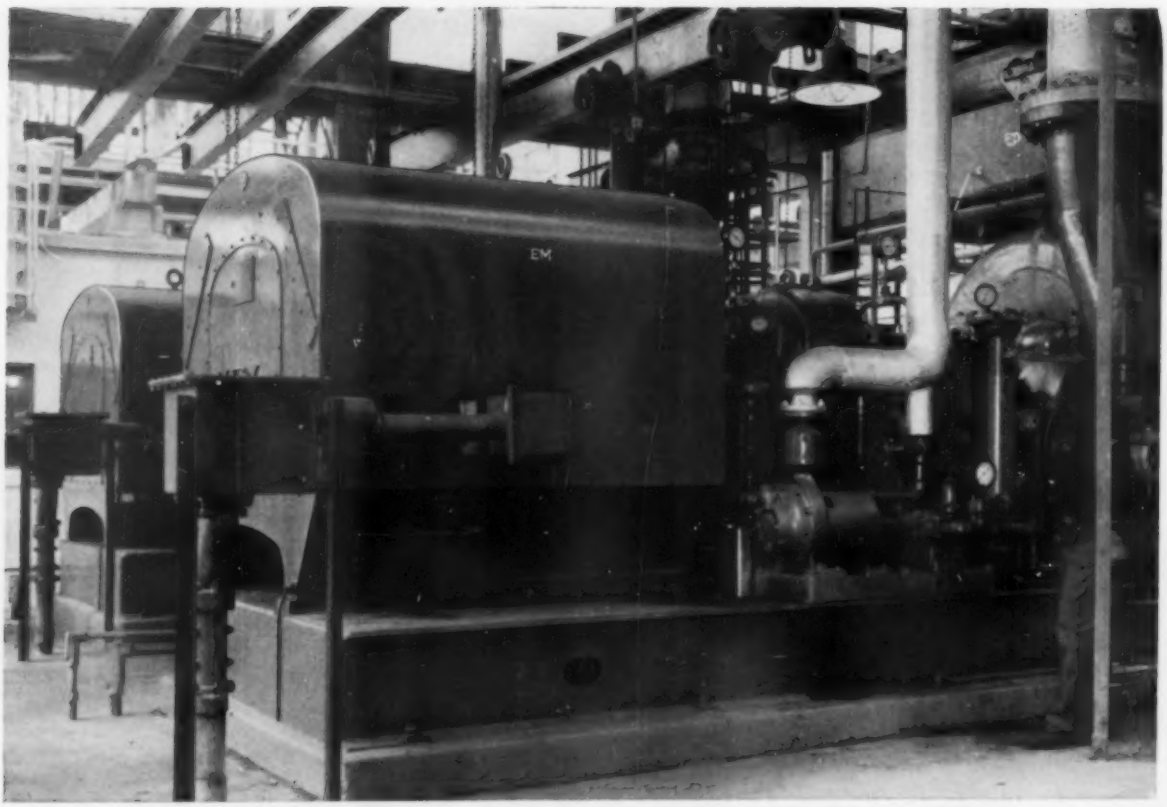
Contact your P&H dealer soon for the complete P&H story.

HARNISCHFEGER

Construction & Mining Division
Milwaukee 46, Wisconsin

THE P&H LINE Excavators: ½ · ¾ · 1½ · 1¾ · 2½ · 3½ and 4 yards
Truck Cranes: 10 · 12½ · 15 · 20 · 25 · 30 · 35 · 45 and 70 tons





Compressor drives...outdoor style!

● Right outdoors in Canadian weather are these two E-M Weather-Protected Induction Motors at the Vancouver, B. C. refinery of Imperial Oil Co., Ltd.

Rated at 1500 hp, 1750 rpm, the Motors drive centrifugal compressors and are among the largest such drive units built to date for outdoor installation without total enclosure.

This installation demonstrates two important advantages of E-M outdoor drives:

FIRST, E-M Weather-Protected Motors do not require expensive indoor floor space.

SECOND, their weather-protected construction allows them to be installed outdoors, away from explosive atmospheres.

E-M Weather-Protected Induction Motors have many other advantages as well. No special foundations are necessary. The protective hood sheds falling or blowing precipitation. Screened air intakes located above the motor feet prevent the entrance of refuse. And because ventilating air enters at low velocity, suspended particles are dropped before they reach vital motor parts.

Special "blow-through" passages provide a by-pass for high velocity gusts of wind. Protective coatings guard the motor interior and exterior from weather hazards. Even with this extensive protection, access is quick and simple without dismantling the motor.

Find out how these E-M Weather-Protected Motors, located outdoors, can cut installation costs and reduce danger on pump or compressor drives. Call your nearest E-M Sales Engineer for full information. Write the factory for E-M Synchronizer No. 40, the special oil industry issue, showing Weather-Protected Motor installations.

ELECTRIC MACHINERY MFG. COMPANY
MINNEAPOLIS 13, MINNESOTA

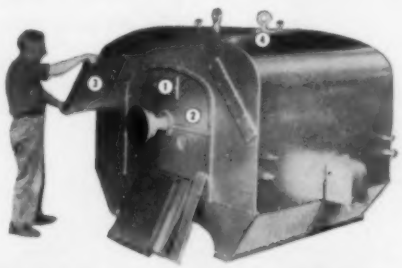
PROTECTION WITH ACCESSIBILITY!

1. Door plates unlock quickly for handy access to bearing filler cap and oil ring inspection hole.

2. Large end plates permit bearing inspection, air-gap measurement, or blow-out of interior.

3. Intake air filters are easily removed for inspection or replacement.

4. Entire "weatherized" steel hood lifts by eyes for "all over" cleaning.



1300-TPA-2160

E-M

Specialists in making motors do exactly what you want them to

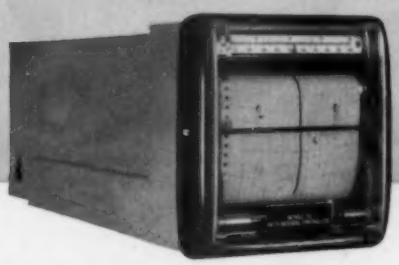
NEW! pneumatic transmitting tachometer with

DIRECT LINEAR SIGNAL

the Foxboro Type 16A Pneumatic Speed Transmitter

- **mounts in any position**
- **accurate to ±½% across entire range**
- **adjustable span and zero**
- **Dust-tight gasketed case continuously purged**
- **Low cost compared with other recording tachometers**
- **Operates on simple force-balance mechanical principle.**

Direct-connects to remote pneumatic recorder or controller, such as Consotrol panel recorder shown below.



At last — a tachometer with 3-15 psi air signal *directly proportional* to rpm! Speed changes are recorded on a uniform-scale chart. Accurate measurements of rpm are easy to read throughout the entire range. No crowded bottom scale!

The Type 16A Speed Transmitter is available for ranges from 0-320 rpm to 0-5300 rpm. Full-scale accuracy of ±½% is consistently maintained. Small and light weight, it can be mounted *in any position* — never needs lubrication.

For rotating equipment having wide speed variations, the Type 16A is ideal. It's available for either clockwise or counter-clockwise rotation, and can easily be incorporated into any present pneumatic control system. Write for full details. **The Foxboro Company, 603 Neponset Ave., Foxboro, Massachusetts, U.S.A.**

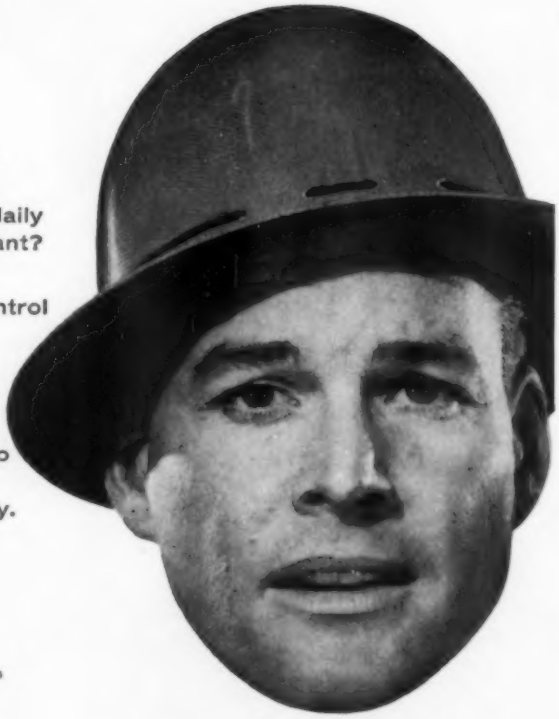
FOXBORO

REG. U. S. PAT. OFF.

PNEUMATIC SPEED TRANSMITTERS

from men who produce organic chemicals...

a new standard for technical assistance



Who is better qualified to give you practical technical assistance on organic chemical problems than the men responsible for the daily operation of a modern organic chemicals plant?

To give you the kind of service you need, operating and design engineers, process control chemists and material handling specialists from our Doe Run Plant are available now to assist your production men with problems common to organic chemicals.

Our experience in producing organics can go a long way in helping you in using these chemicals. For information call or write today.

Ethylene Oxide, Ethylene Glycol, Ethylene Diamine, Diethylene Glycol, Triethylene Glycol, Polyethylene Glycols (Poly-G's), Polyamines, Ethanolamines, Dichloroethylether, Ethylene Dichloride, Surfactants (Poly-Tergents), Glycol Ether Solvents (Poly-Solv's)

Poly-G, Poly-Solv and Poly-Tergent are registered trademarks

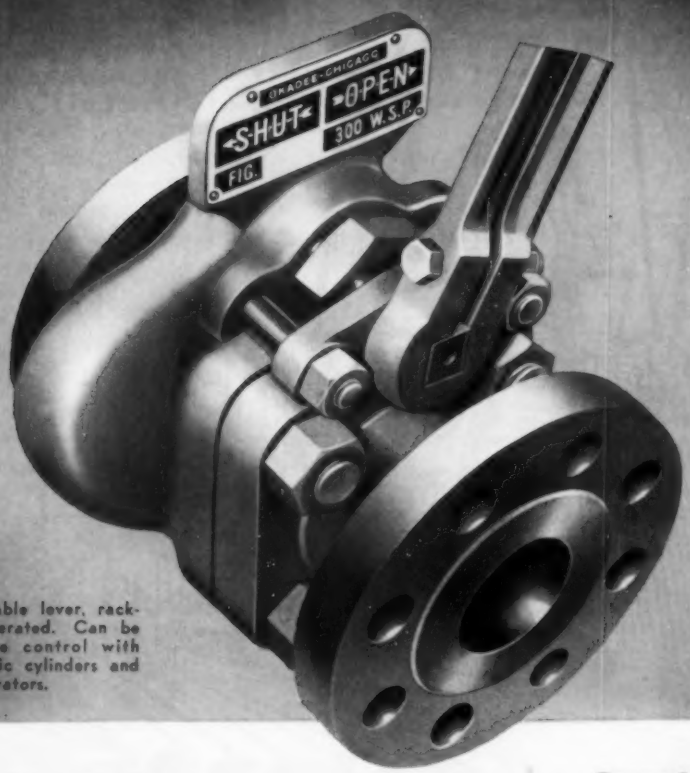
OLIN MATHIESON CHEMICAL CORPORATION

ORGANIC CHEMICALS DIVISION

OLIN MATHIESON CHEMICAL CORPORATION
ONE PARK AVENUE, NEW YORK 16, NEW YORK

6043

New, Economical Protection Against Corrosion!



Okadee Valves available lever, rack-and-pinion, wheel operated. Can be equipped for remote control with hydraulic or pneumatic cylinders and electro hydraulic operators.

OKADEE VALVES now available Nickel Coated by KANIGEN* Process

Kanigen is the chemical process you've read about for coating lower cost metals with a durable coating of nickel. Because the coating thickness can be controlled to minute degrees, critical Okadee Valve tolerances are not affected. There is no excessive overplating. Furthermore, even in thin plating coats, *zero* porosity is obtained.

This chemical nickel coating is equal to, and usually better than corrosion protection afforded by either pure or wrought nickel in most applications. It is recommended where contamination is a problem. Increased valve life is further assured by the excellent wear and abrasion resistance of the coating. Hardness is approximately 48 Rockwell C and can be increased to 66 Rockwell C with heat treatment.

For all these many advantages, nickel coated Okadee Valves cost far less than stainless — approximately 35% more than steel for 2 mill thickness.

Okadee, and chemical nickel coating are well worth looking into!

*Developed by General American Transportation Co.

Proved in severe H_2S REFINERY SERVICE

Here's an on-the-spot report of a critical inspection . . .

"Since this was one of the first valves with nickel coating this company installed, many officials were present to inspect the internal sections of this valve. The 4" valve was disassembled and drained (having quite a lot of Hydrogen-Sulphide present). After cleaning thoroughly in solvent, the parts were closely inspected with a high power glass to detect any signs of corrosion on the various metal parts of the valve. We are very pleased to report that the initial nickel coating given this valve is still 100% perfect. At no place on the various surfaces of the parts and internal section of the valve were there any signs of corrosion. The Stellite seals and discs cleaned up perfectly and showed no unusual cutting or wear although they had been on this severe application for over a year."

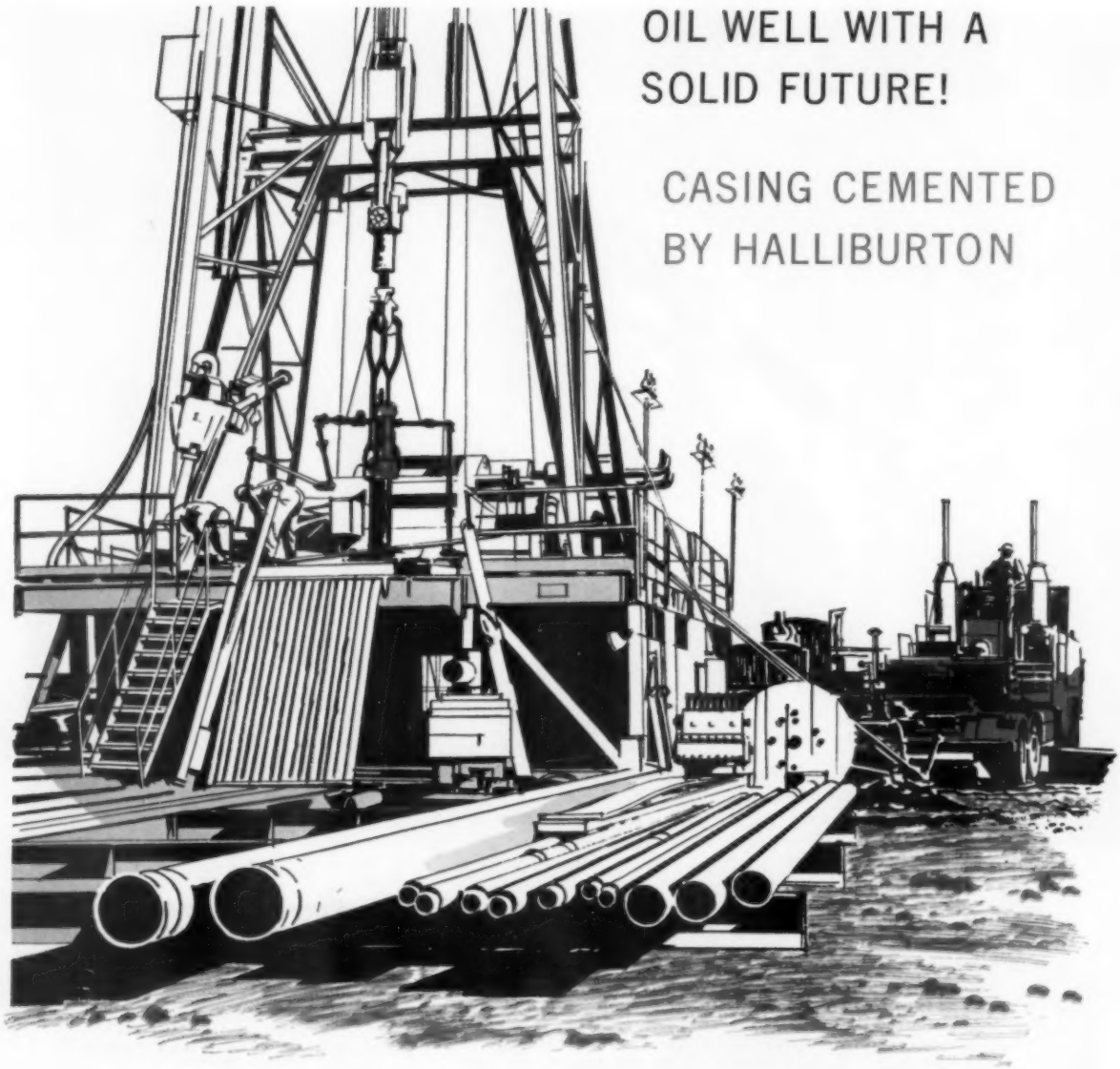
OKd.

Okadee COMPANY

332 South Michigan Avenue, Chicago 4, Illinois
REPRESENTATIVES IN PRINCIPAL CITIES

OIL WELL WITH A SOLID FUTURE!

CASING CEMENTED BY HALLIBURTON



Whenever a promising pay zone is reached, the next important step is to provide that zone with as much protection as possible . . . so that subsurface problems are kept to a minimum . . . and maximum profits result. That's why thousands of successful oilmen—ever since 1924—have called on Halliburton for oil well cementing to help protect their investments.

Halliburton cementing helps reduce the danger of casing corrosion . . . helps reduce the danger of blowout or casing collapse due to high pressures behind casing . . . helps protect promising producing zones and fresh water zones from contamination . . . and helps safeguard formations and casing strings from numerous other underground dangers.

Make sure that your well enjoys a solid future by specifying Halliburton for your next cementing job.

HALLIBURTON

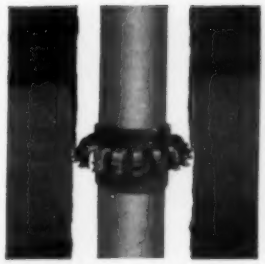
OIL WELL CEMENTING COMPANY

DUNCAN, OKLAHOMA

TWO TYPES OF EFFECTIVE WALL CLEANERS:

New Design For Reciprocating Cleaner

HALLIBURTON NEW RECIPO WALL CLEANER...



Removes filter cake from wall of bore hole to allow better bonding of cement to formation and casing. Some of the advantages offered by the NEW Recipo Wall Cleaner are:

- Flexible, tough rubber cleaning fingers minimize bore hole or filter cake damage while running casing, yet are sufficiently rugged to thoroughly clean well when casing is reciprocated.
- Wide cleaning fingers clean broader area of bore hole wall. Aid in breaking up channeling of cement.
- Wide fluid passage areas between rubber cleaning fingers help reduce circulating pressures and bridging action of filter cake cuttings and lost circulation materials.
- Cleaning fingers do not bend into permanent distortion.
- Hinged type design permits fast, easy installation on casing.

Removes Mud Cake By Rotation Of Casing At Surface

HALLIBURTON ROTO WALL CLEANER...

Removes mud cake from walls of the hole before cementing casing, thereby minimizing precautionary or remedial squeeze jobs. Roto Wall Cleaners have these advantages:

Do not bridge off the annulus.

- Provide an open passagewey for free flow of fluids while running casing, circulating, cementing, etc.
- Reduces hazard of sticking casing off bottom because casing remains at casing point.

THESE HALLIBURTON TOOLS
help solve specific problems in oil well cementing

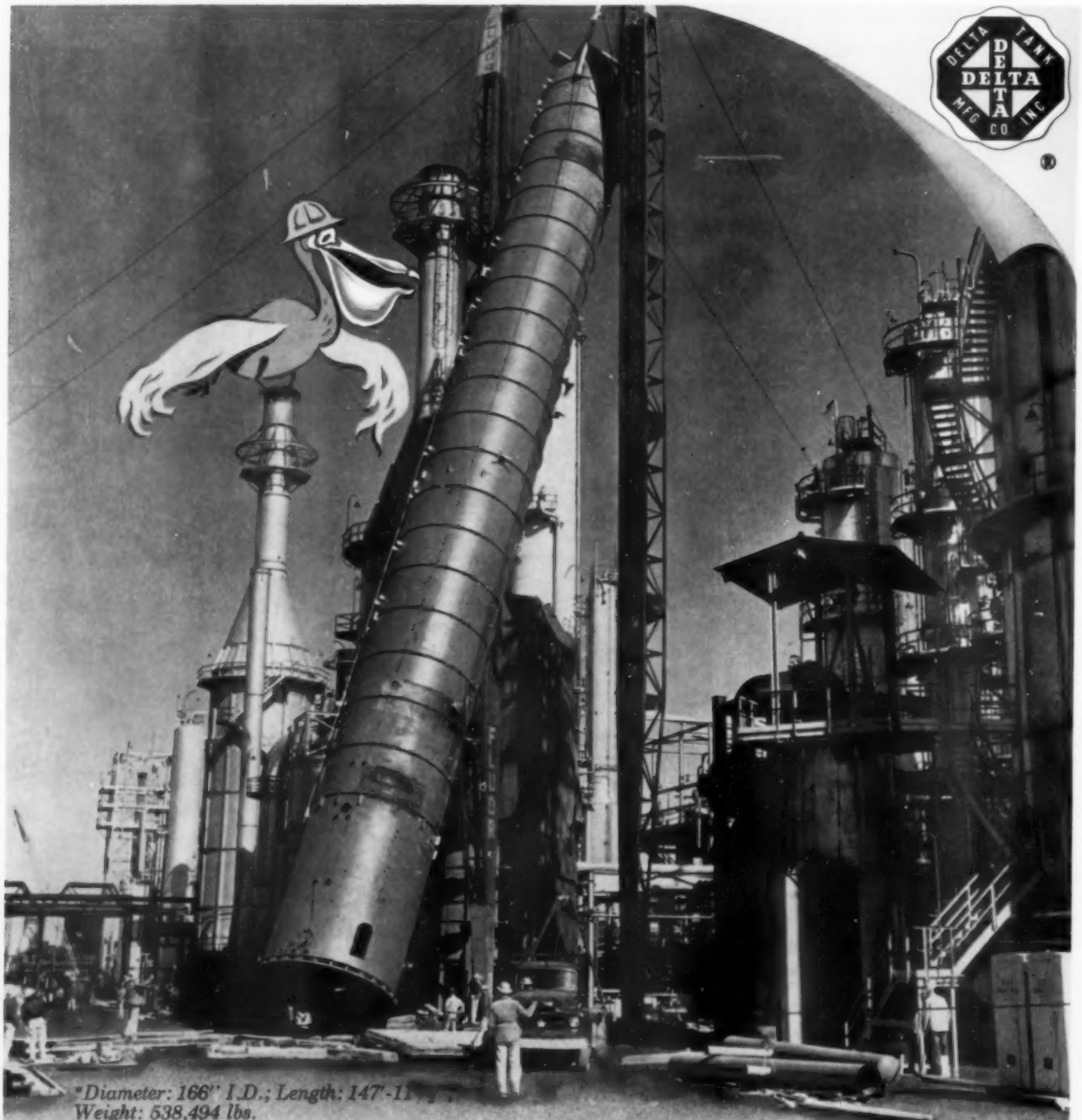
HALLIBURTON FORMATION PACKER SHOE... installed on the first joint of a string of casing offers many advantages. This shoe is used in all areas where conditions require casing to be set on top of the producing formation.

- Packer Shoe packs off open hole below casing, protecting low-pressure formations from cement contamination during cementing.
- Packer Shoe floats in and guides casing to bottom.
- Packer Shoe has a Super-Seal Back-Pressure Valve to keep cement slurry from backing up inside the casing above the Formation Packer Shoe.
- Packer Shoe provides circulation of fluids through end of Shoe until shoe packer rubber is expanded and set.

HALLIBURTON FORMATION PACKER COLLAR... installed on casing above the shoe joint to help protect a lower formation from contamination while cementing. Several joints of casing or liner may be installed on lower end of packer collar; the packer is set and cement pumped down casing and out into annulus above expanded packer. Used in setting liners, perforated pipe and screen in salt water disposal wells, water flooding projects and in fields where "Full Hole" cementing is desirable.

CEMENTING SERVICES

"A WELL WORTH CEMENTING IS WORTH CEMENTING WELL"



"Diameter: 166" I.D.; Length: 147'-11"
Weight: 538,494 lbs.

ALL IN ONE PIECE!

The contractor saved money, and the refinery saved money because this reformate fractionator tower* was delivered to Texas all in one piece. The saving was in costly on-the-job final fabrication expenses.

This tower is another in the steady parade of custom-built pressure vessels delivered from Delta Tank fabrication shops to the petroleum and petro-chemical industries.

Why not let Delta Tank's manufactruing experience and production facilities work for you to meet your pressure vessel problems?

DELTA TANK MANUFACTURING COMPANY, INC.

P. O. BOX 1469 • BATON ROUGE, LA.

PLANTS: BEARDSTOWN ILL. • MACON, GA.
SALES OFFICES: HOUSTON, TEXAS • NEW YORK, N. Y.
EXPORT OFFICES: INTERNATIONAL TRADE MART • NEW ORLEANS, LA.

...proof of Parsons' performance!

60% of Parsons' contracts for the design and construction of hydrogen desulfurization, sulfur recovery and catalytic reforming facilities have been with previous customers. Proof positive of satisfactory performance.

PARSONS
means progress

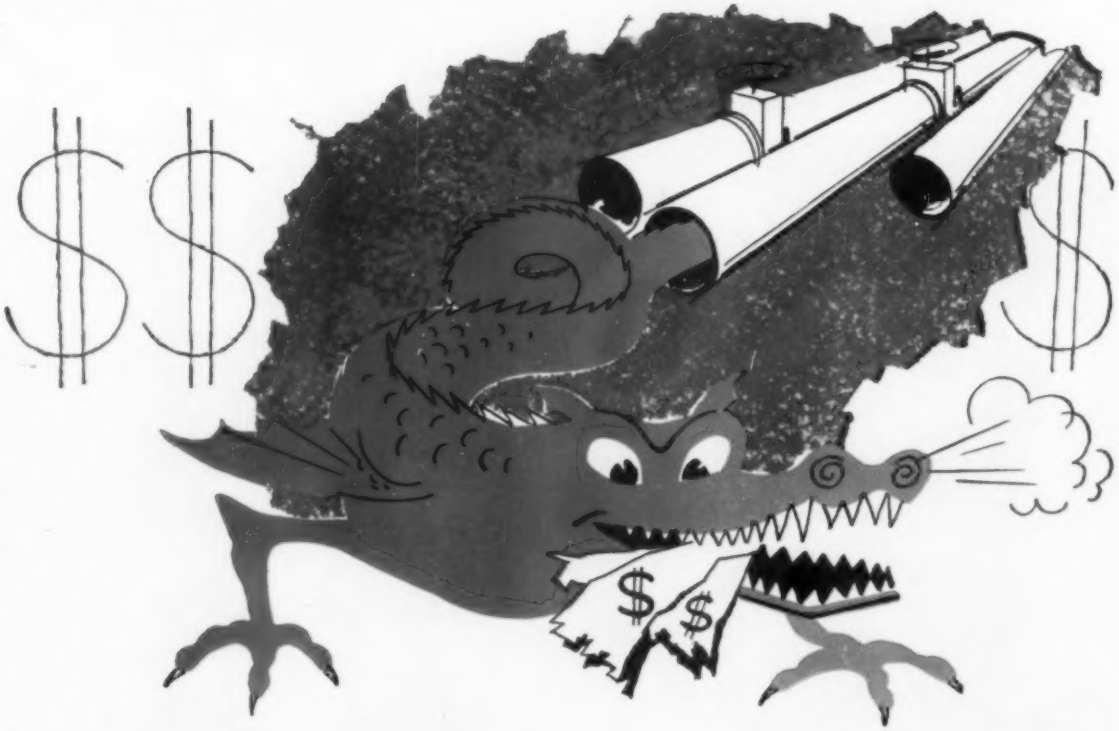
THE RALPH M. PARSONS COMPANY

NEW YORK
PASADENA
WASHINGTON

ENGINEERS • CONSTRUCTORS
LOS ANGELES

ANKARA
BAGHDAD
BEIRUT
JEDDAH
KARACHI
MADRID
NEW DELHI
PARIS
TORONTO

UNICOR® keeps corrosion from eating a big hole in your profits



Talk about money down the drain! Look at the ways corrosion can lose you money:

1. Reduced flow capacity means less volume handled per day. Corrosion in your pipeline takes up money-making space, reduces C factor and output.
2. Filters cost money. Take a look at your filter replacement cost sheet for the past year and you'll see what we mean.
3. Downtime for filter cleaning and replacement is a dead weight on overhead. You're not making money when you're not on stream.
4. Equipment replacements aren't cheap, either. When corrosion takes over tanks and pipelines, you're out-of-pocket for new ones.

And now look at the ways UNICOR saves your money and your equipment:

1. Unicor is a film-forming, oil-soluble inhibitor that prevents all types of pipeline corrosion. Tanks, vessels, pipelines are protected whether full, half-full or empty.
2. Unicor increases C factor to a maximum, reduces power costs, filter replacements and scraping operations.
3. Unicor costs about $0.001 (one-tenth of a cent!) per barrel of product. One molecule of Unicor to one million molecules of product gives effective anti-corrosive action.

Stop corrosion and fouling. Save money and improve product quality. Specify UNICOR for any internal pipeline corrosion problems. If you'd like to evaluate UNICOR before you send an order, write for information and samples.

UNICOR® One of the family of superior UOP additives and inhibitors available to the petroleum industry

UNIVERSAL OIL PRODUCTS COMPANY

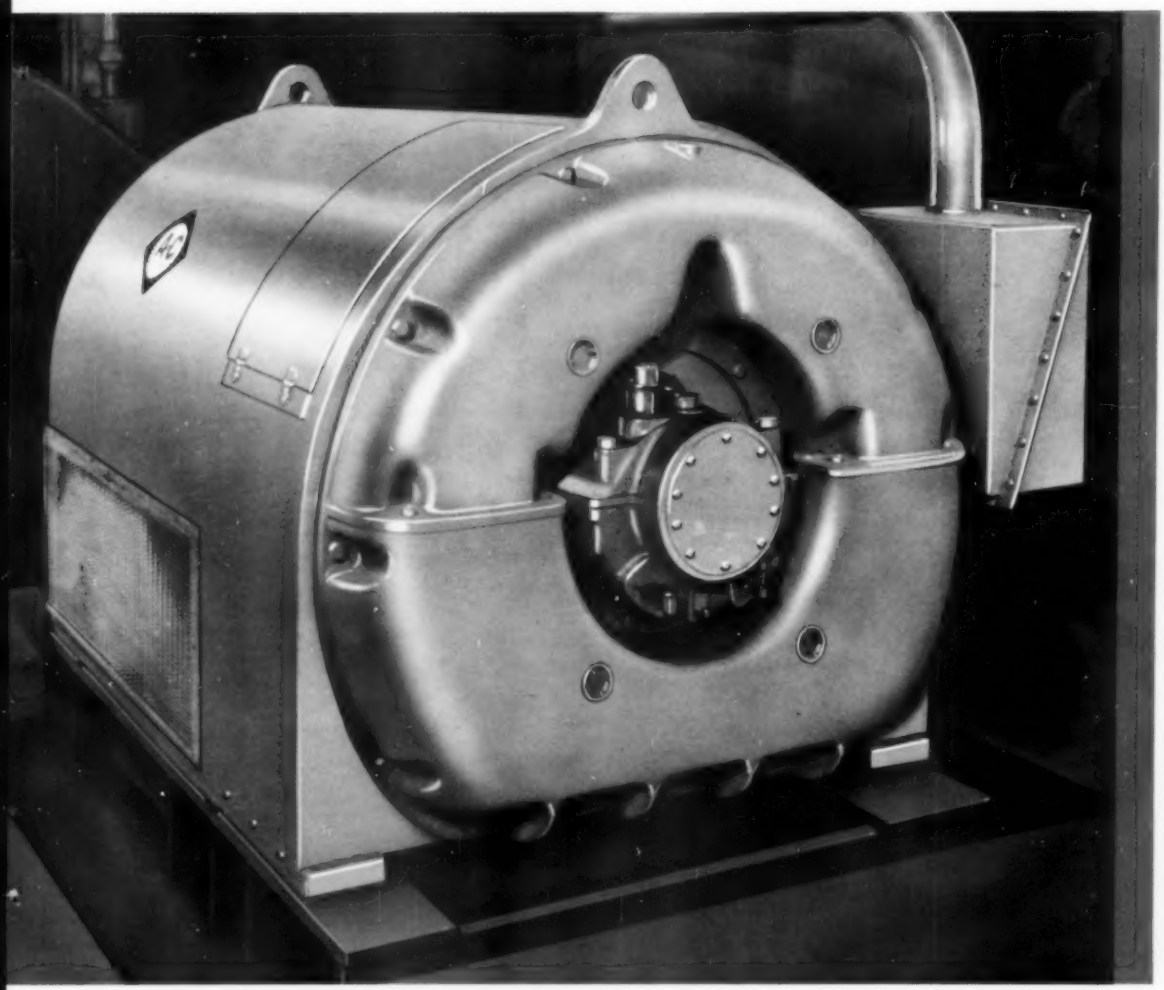
30 Algonquin Road, Des Plaines, Illinois, U.S.A.

More Than Forty Years Of Leadership In Petroleum Refining Technology

Revolutionary Advance in Motor Protection

made possible by SILCO-FLEX insulation

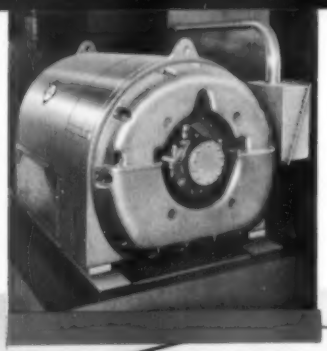
plus 10 integrated mechanical features



Designed to meet needs of chemical, paper, petroleum, metals, power and rock products industries where moisture, dirt, abrasive dusts or corrosive atmospheres are a problem.

ALLIS-CHALMERS

A-5636



New Motor is

super-sealed

It's drip-proof — yet withstands moisture • abrasive dust • chemicals • high humidity • heat

The *Silco-Flex* system of insulation is used on all stators. Field coils of synchronous motors are bonded in heat-stabilized resins, enclosed in a resin-impregnated sheath of oriented glass fibers and bond-locked on the pole structure.

The superior electrical protection of Super-Sealed motors results from the insulating *system* used... not just the insulating material. The same material, conventionally applied, would retain certain weaknesses of conventional insulation.

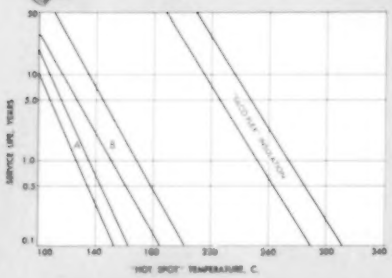
Applied the A-C way, it has these qualities that add reliability and service life:

Dimensionally stable — withstands heating, thermal shock, vibration and fatigue at elevated temperatures.

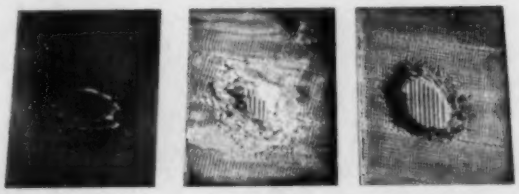
Sealed throughout — resistant to most chemicals, water, high humidity, weather, aging, corona and lubricants.

Homogeneous — provides a void-free dielectric barrier, homogeneous under extremes of differential expansion and contraction due to thermal cycling.

All Super-Sealed motors have revolutionary Silco-Flex insulation

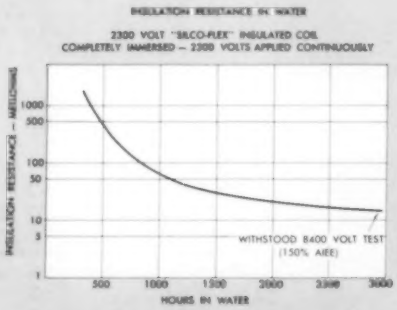


Heat resistant — *Silco-Flex* insulation gives much longer service life under higher temperatures than conventional materials.

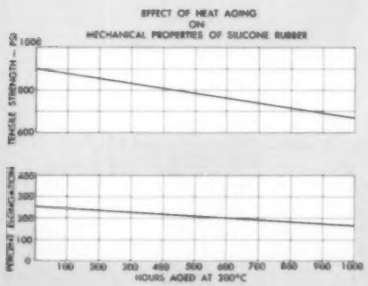


Silco-Flex Insulation | Polyester Mica Tape | Asphaltum Mica Tape

Abrasion resistant — Samples of insulation show effect after sandblasting for one minute with 90-grit aluminum oxide and 100-psi air. Nozzle to sample distance was six inches, thickness equivalent to 2300-volt insulation. Note difference in abrasion.



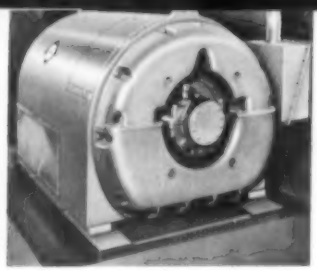
Moisture resistant — Test curve shows that *Silco-Flex* insulation, after 3000 hours of total immersion with 2300 volts impressed on coil, withstood high potential test of 8400 volts without injury.



Flexible, resilient — Rubbery *Silco-Flex* insulation remains flexible and resistant indefinitely. It is especially resistant to mechanical abuse and to stresses of overloading, rapid starting and stopping.

Silco-Flex is an Allis-Chalmers trademark.

ALLIS-CHALMERS



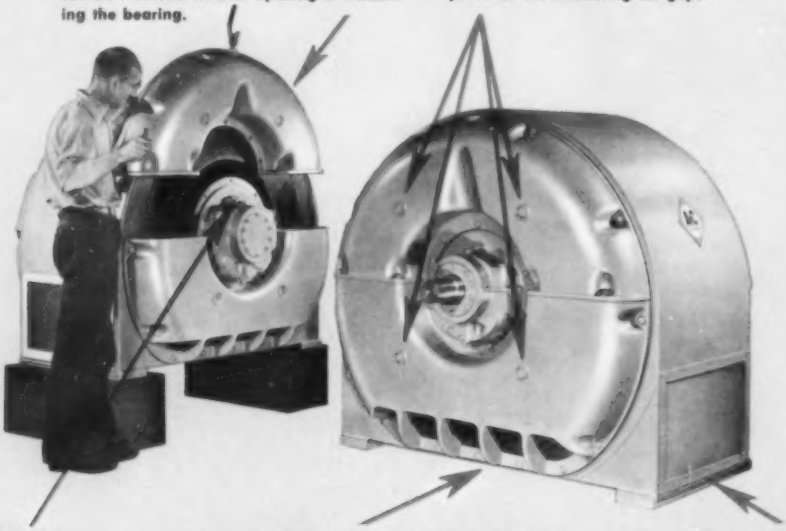
New Super-Sealed motors

10 mechanical features

Super-Sealed motors combine the perfect insulation with features that assure the mechanical as well as the electrical reliability of these motors.

Accessibility — Split-type end shields can be removed without opening or disturbing the bearing.

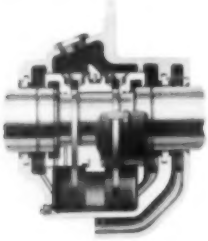
Ease of Inspection — Four points are provided for measuring air gap.



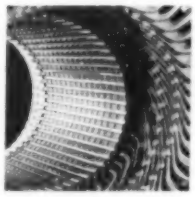
Clean Check — Glass inspection bulls-eye permits checking operation of oil rings without dirt falling inside bearing.

Full Circle of Protection — Steel plate across bottom of motor protects it from dirt and rodents.

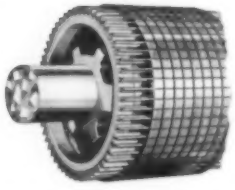
Clean Appearance — Foundation bolts are hidden, machine is clean-looking.



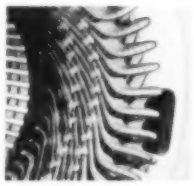
Self-Aligning Capsule-Type Bearings are center seated with single seat. Breather relieves pressure of oil in bearings that could cause leakage.



Precision Construction— Slot sticks are non-hygroscopic-trapezoidal, fabric base phenolic. End turns, spaced with polyester glass mat spacer pieces, are laced and tied with flat lubricated glass tubing for long trouble-free life.



Solid Construction—Silver-brazing rotor rods to end ring assures a good joint.



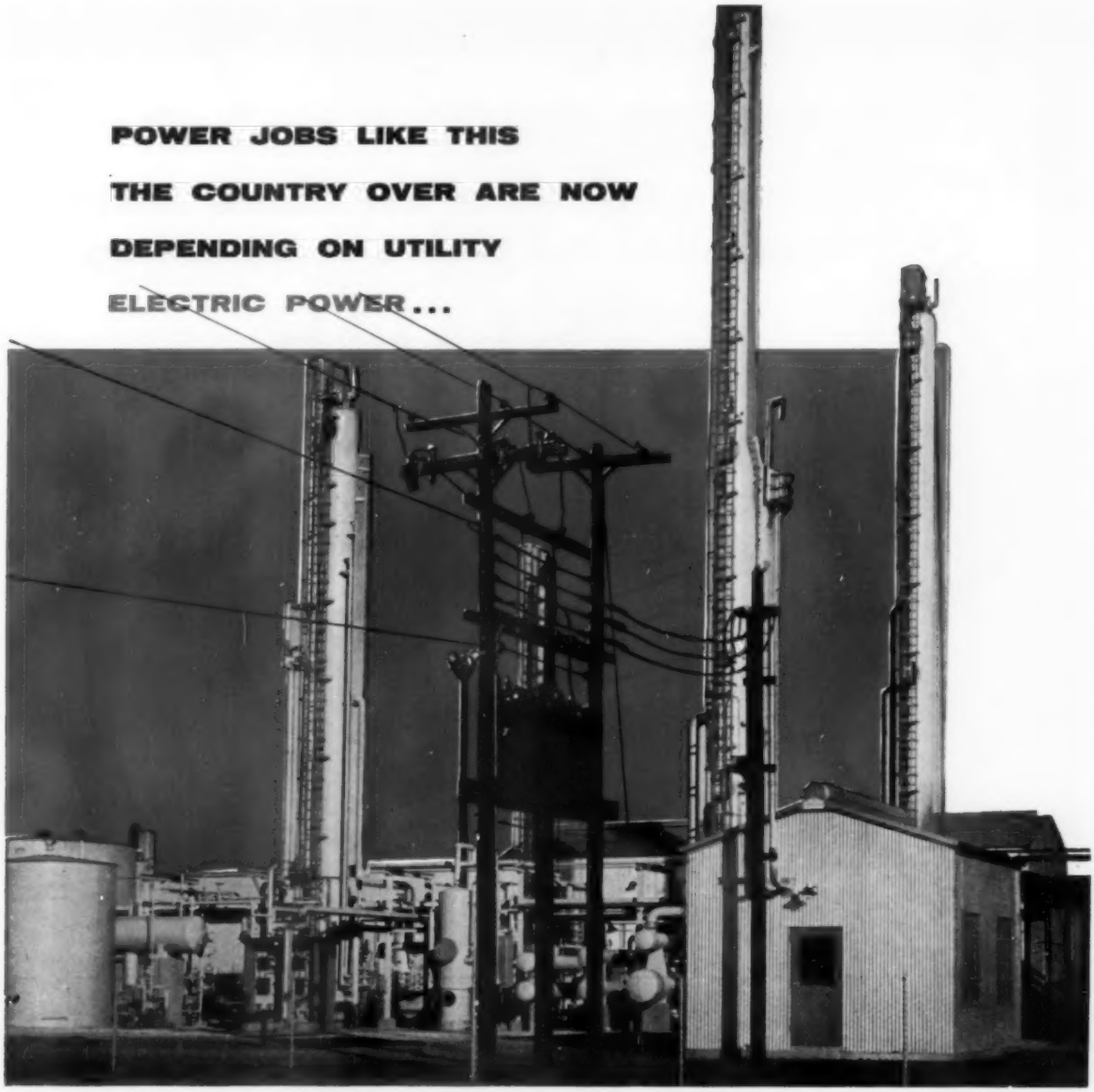
Rigid — End turns of higher speed motors are supported by insulated coil support rings to prevent injurious distortion due to high starting torque and frequent starting.

Timesavers—Separate plates provided to show direction of rotation and magnetic center. Terminal box is amply sized and diagonally split. Leads are brought out through grommet.

For the complete story, call your nearby A-C office or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

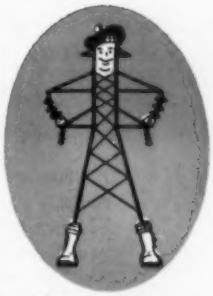
ALLIS-CHALMERS

POWER JOBS LIKE THIS
THE COUNTRY OVER ARE NOW
DEPENDING ON UTILITY
ELECTRIC POWER...



Progressive Management is taking a second look

One of the biggest expansions in refining operations is coming up. If you have any part in this important development don't let your company decide on power until the modern benefits of UTILITY ELECTRIC POWER have been carefully investigated. Call in the sales engineer of your Electric Service Company while your plant is in the planning stage. Convincing facts and helpful counsel are yours for the asking.



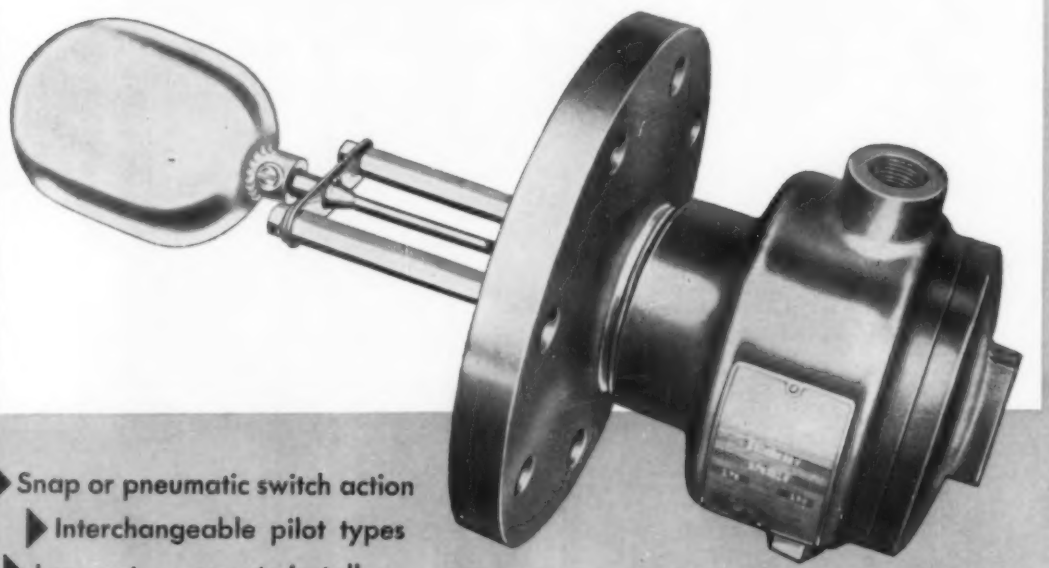
Be modern . . . Be progressive . . .
Use UTILITY ELECTRIC POWER.

PETROLEUM ELECTRIC POWER ASSOCIATION

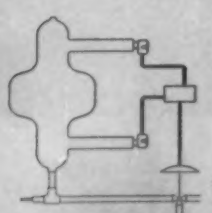
P. O. BOX 35006 DALLAS, TEXAS

Series 2800—The oil man's Level Controller for Lease Automation

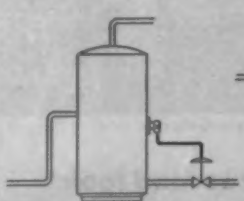
FISHER



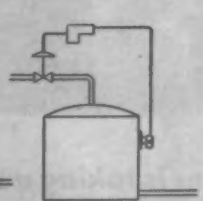
- Snap or pneumatic switch action
- Interchangeable pilot types
- Low cost . . . easy to install



Type 2806-252V controlling level of volumetric measurement vessels for accurate control of liquid volume.



Separator or line scrubber control



High level shut-in control in tank farms

252V HOUSING ASSEMBLY

Sizes—4" iron or steel, flanged, with ratings up to 900# ASA. Available with coupling type, welding type or screwed bar housing. Float size 3½" x 6" stainless steel. Pressures up to 1000 psi. Solid plastic available for pressures over 1000 psi. Flexure tube—K Monel.

PILOT ASSEMBLIES

Type 2800—Explosion-proof electric switch assembly—snapping range—$\frac{5}{16}$"—1" with 1.0 specific gravity liquid. Electrical rating—20 amp., 125, 250, 440 volt AC. Color coded wiring.

Type 2806—Pneumatic relay with snapping range of ¼" to 1¼", with 20 psi air supply.

Type 2807—Pneumatic relay for throttling service. Available with horizontal or vertical floats for wide range of proportional band requirements.

The float actuated 2800 series is a low cost, snap acting liquid level control available with either electric (explosion-proof) or pneumatic switch action. Pilot is interchangeable on float housing assembly. Features the stab-in type of tank mounting for easier installation.
Write for Bulletin F2800 for complete information.

IF IT FLOWS THROUGH PIPE ANYWHERE IN THE WORLD...CHANCES ARE IT'S CONTROLLED BY...

FISHER GOVERNOR COMPANY

Marshalltown, Iowa / Woodstock, Ontario / London, England

FISHER® Controls

SINCE 1880

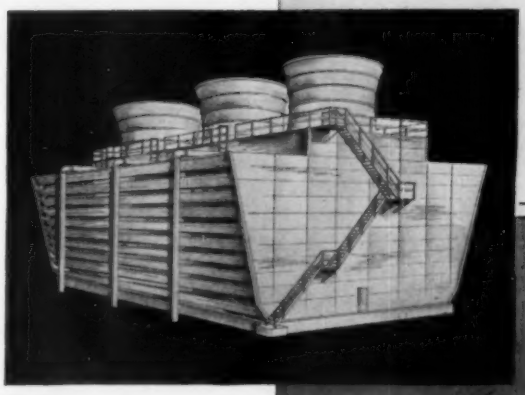
New Class 600

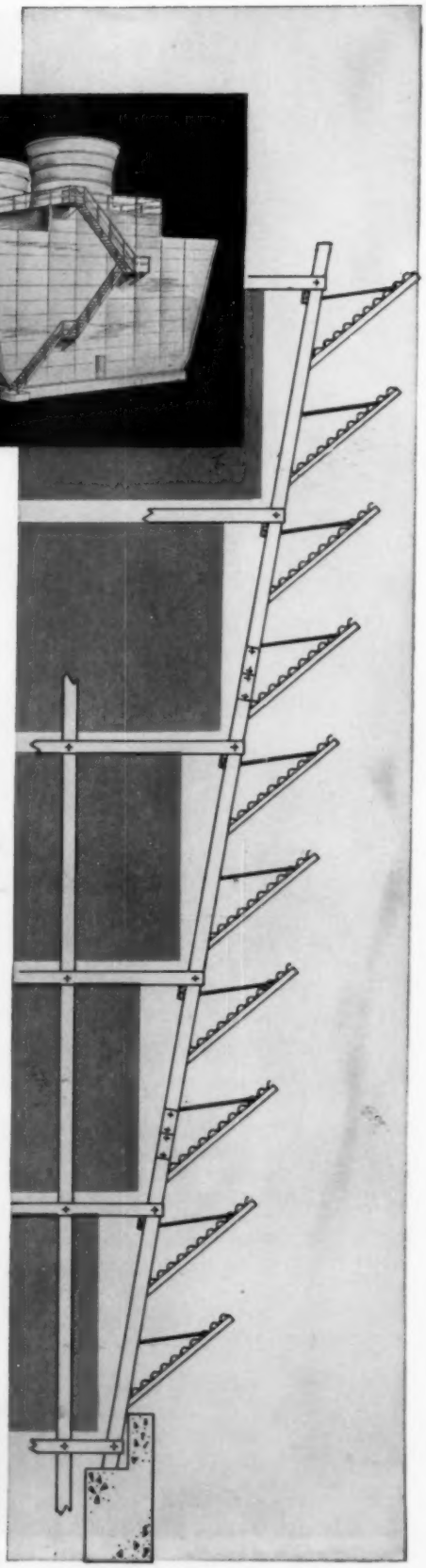
MARLEY

Double-Flow

has the

Profile with a Purpose





Comprised of a combination of "active" angles, the contour of Class 600 cooling towers is completely functional with positive influence on performance and operation. Each angle has its specific purpose and, in conjunction with the others, creates additional advantages.

Louver Angle: The 42-inch louvers are positioned on 3-foot centers at an angle of 40° from horizontal. This arrangement readily admits more air to do more cooling—with inherent lowering of static drop, higher working velocities in the fill become completely practical. It increases the atmospheric performance potential (always greatest in cross-flow towers) and it eliminates splash-out.

Structural Angle: The 10° angle outlined by the louver posts is of equal importance. It makes possible uniform fill width or uniform *air travel* at all levels in the cooling chamber. Result: more performance per cubic foot of structure gained through efficient air utilization.

Fill Angle: With a uniform fill-to-louver distance maintained at every fill story, Class 600 Double-Flows set up an effective barrier against icing. The normal *water travel* creates a continuous curtain of water between fill and louvers without splash-out. There are no non-functional voids so the heat of the water prevents formation of sheet ice and blocking of air entrance.

MARLEY **The Marley Company**

Kansas City, Missouri

Trial by fire

DUCTILE IRON VALVES ARE THE LATEST ADVANCE IN WALWORTH'S CONTINUING RESEARCH AND DEVELOPMENT PROGRAM

This fiery demonstration is dramatic proof of Walworth's constant effort to develop better valves. This use of ductile iron — "the cast iron that can be twisted and bent" — results in new Walworth Valves that are stronger than gray cast iron valves and several times tougher. Ductile iron combines the corrosion resistance of gray iron and the strength of steel. Ductile iron valves have many times greater corrosion resistance than more expensive steel valves.

In service these Walworth Ductile Iron Valves will solve many of the corrosion, cost and maintenance problems for the marine, petroleum, gas, and chemical industries. Ductile iron studies are just a part of the continuing work of Walworth's Research and Product Development Division.

For almost every piping job there is a Walworth Valve . . . in a type, size, and material to meet your requirements . . . Gate, Globe, Angle, Check, and Lubricated Plug Valves in a variety of pressure ratings. For more information contact your local Walworth Distributor.

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In the first stage of thermal shock test, oil fire and gas flame heat a 6-inch Walworth Gate Valve constructed of ductile iron to a red hot temperature of 1350°F.

Now the Walworth Valve is quickly chilled with streams of water. A cast iron valve could shatter under such a drastic and rapid change in temperature.

Slightly scorched, the valve keeps its shape and dimensions despite the ordeal and is completely operable. The test proved that, under these conditions, Walworth ductile iron valves have a thermal shock resistance equal to that of more expensive steel valves.

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FORGED STEEL WEDGE GATE VALVES

. . . for water, steam, gas, and air service to 850°F. Oil or oil vapor to 1000°F. OS & Y types. Screwed or socket welding ends. Bolted or union bonnets. Sizes from ¼ to 2 inches.

FABRICATED PULP STOCK VALVES

. . . for lines carrying pulp stock in varying concentrations, slurries, and other fibrous materials in suspension. All-welded stainless steel construction. Corrosion resistant. Sizes from 3 to 30 inches.

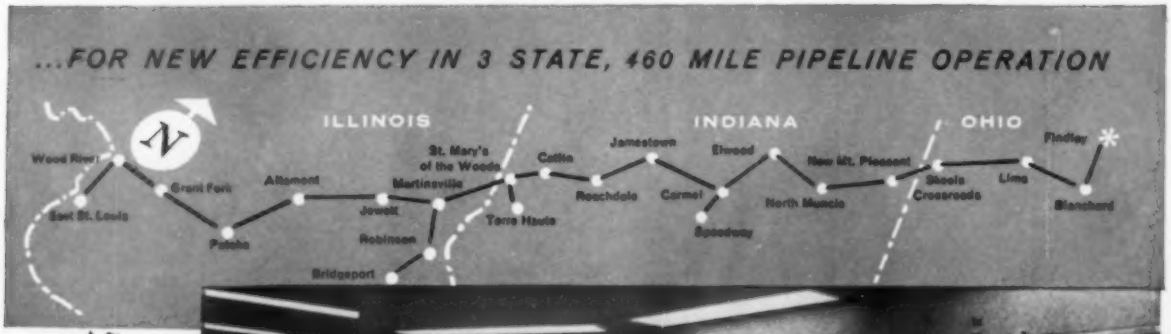
PVC VALVES AND FITTINGS

. . . made of rigid, unplasticized polyvinyl chloride. Highly resistant to chemical attack. Non-toxic, Non-aging. Extremely low flammability. Sizes from ½ to 4 inches.

SOUTHWEST FABRICATING & WELDING CO., INC. • M&H VALVE AND FITTINGS CO. • WALWORTH COMPANY OF CANADA, LTD.

OHIO OIL replaces wire lines with **MOTOROLA MICROWAVE**

...FOR NEW EFFICIENCY IN 3 STATE, 460 MILE PIPELINE OPERATION



* Master Control Console Office, Findlay, Ohio

HERE'S HOW MOTOROLA MICROWAVE IS WORKING FOR OHIO OIL COMPANY . . .

Check the applications that could serve your operations.

- ☐ **VOICE CHANNELS**—24 duplex, 5 simplex party lines
- ☐ **REMOTE CONTROL** of two automatic pumping stations
- ☐ **TELETYPEWRITER**—3 circuits, 10 stations
- ☐ **SELECTIVE TELEMETERING**—Channels return 5 types of information
  1. Tank Gauging—Liquid Level
  2. Pressure—Suction and Discharge
  3. Specific Gravity—Pipeline Contents
  4. Pipeline Flow Meter Readings
  5. Temperature Readings—Pipeline Contents
- ☐ **VHF RADIO**—3 control points operate 8 base stations

Into this huge master console—the "nerve center" for Ohio Oil's "crude" and "product" pipe line operation—is fed control and supervisory data gathered throughout 23 stations along the microwave system. This data is transferred to a "batchboard" which provides an overall operational picture. From the console, the operator can monitor and control valves and pumps at crude oil pumping stations, eliminating the need for 24-hour attendance at these points.

Along the entire system, telephone, teletypewriter, telemeter and remote control circuits provide dependable communications, free of weather damage or interference. VHF radio base stations, at several microwave repeater stations, supply system-wide coverage to and from vehicles equipped with Motorola 2-way radio.

"It takes efficient, reliable communications facilities to keep oil moving along our 'Big Inch' pipe line 24 hours a day," says Mr. Ralph M. Slough, manager of pipe line communications, Ohio Oil Co., "and Motorola Microwave gives us a better and more efficient operation than we obtained with our previous wire line arrangement."

For a hundred miles or a thousand, Motorola Microwave provides dependable communications at lower overall costs—let us prove that Motorola Microwave can do a better job for you, too!

MOTOROLA MICROWAVE

MOTOROLA COMMUNICATIONS & ELECTRONICS, INC. • A SUBSIDIARY OF MOTOROLA, INC. • 1400 N. CICERO, CHICAGO 51, ILL.

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CYANAMID

AMERICAN CYANAMID COMPANY
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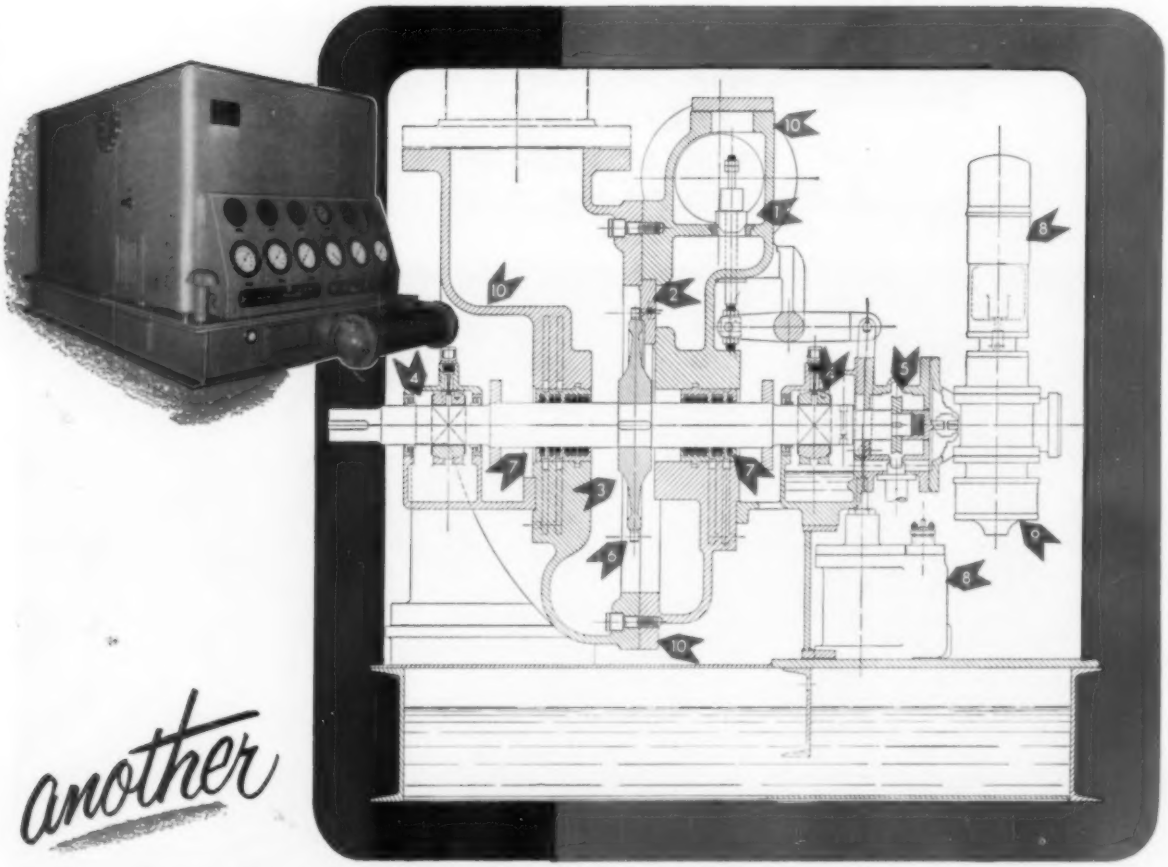

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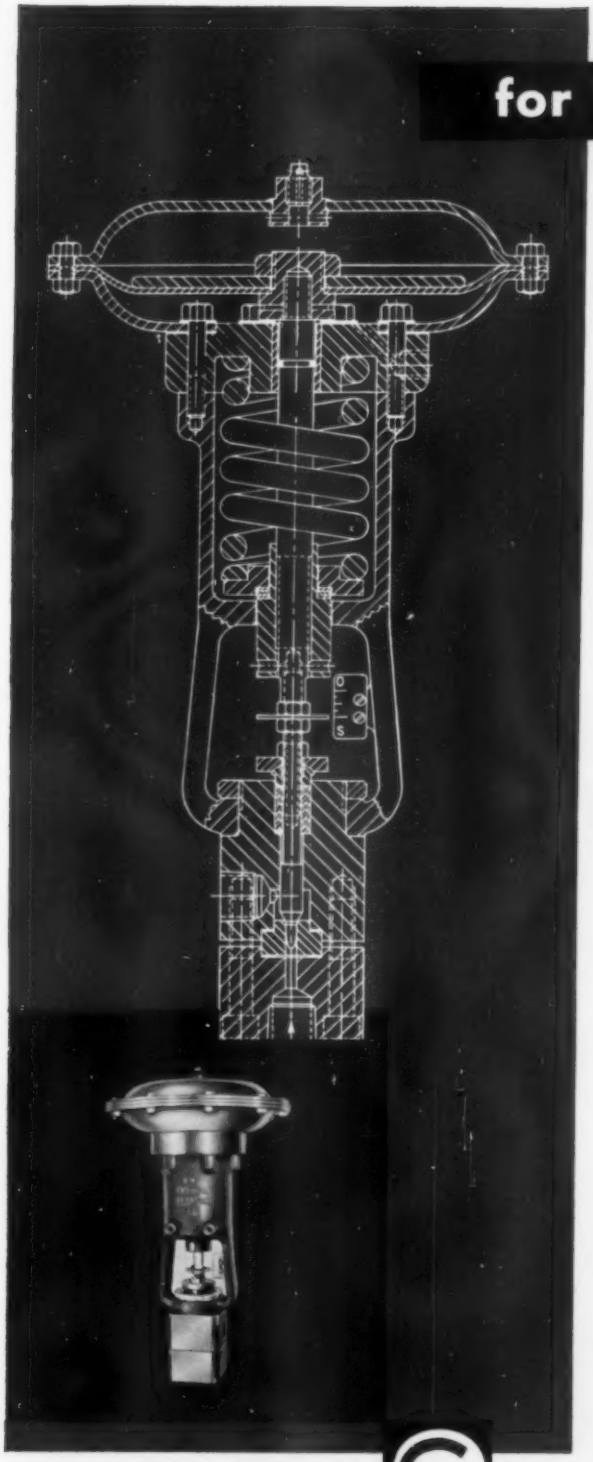

for 10,000 psi service

CASH STANDARD TYPE 505

diaphragm operated high pressure control valve

Specially designed to handle gases and liquids in high pressure drop, on-off or throttling service, with dead-end shutoff.

pressure and temperature rating:

10,000 psi at —40 to 400°F.

action:

Direct or reverse.

packing:

Teflon V-ring, bolted gland.

spring:

Enclosed type with thrust bearing on adjusting screw. 3-15 and 6-30 psi ranges standard.

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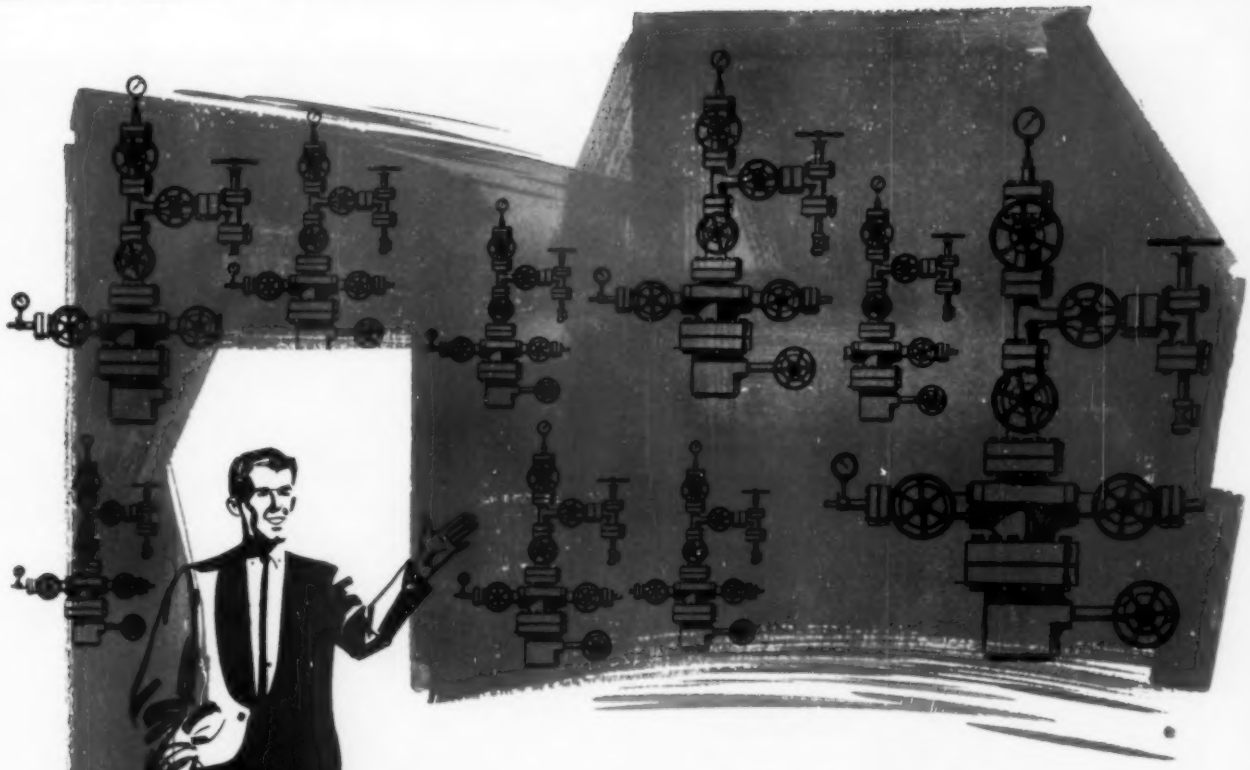
it's the CATALYST that counts



we can show you the forest because of the trees

Many times oil men feel they are in a poor position financially simply because they can't see the entire picture of their operations. Caught in the complexities of their day-to-day activities, they are unable to survey their properties in a realistic, objective manner. And as a result, many times they end up working for their creditors.

Increased operating costs spell falling profits. And that means trouble. While there is no short cut way out of this problem, The Commerce working with your legal and tax counsel can many times show you how to increase profit by reducing costs. Tighter managerial control, an analysis of costs, and recommendations for changes have increased the profit of other oil men. If your problems are similar, come to the bank that actually does know the oil business and that can help you.

E. O. Buck, vice president, Oil Loan Department

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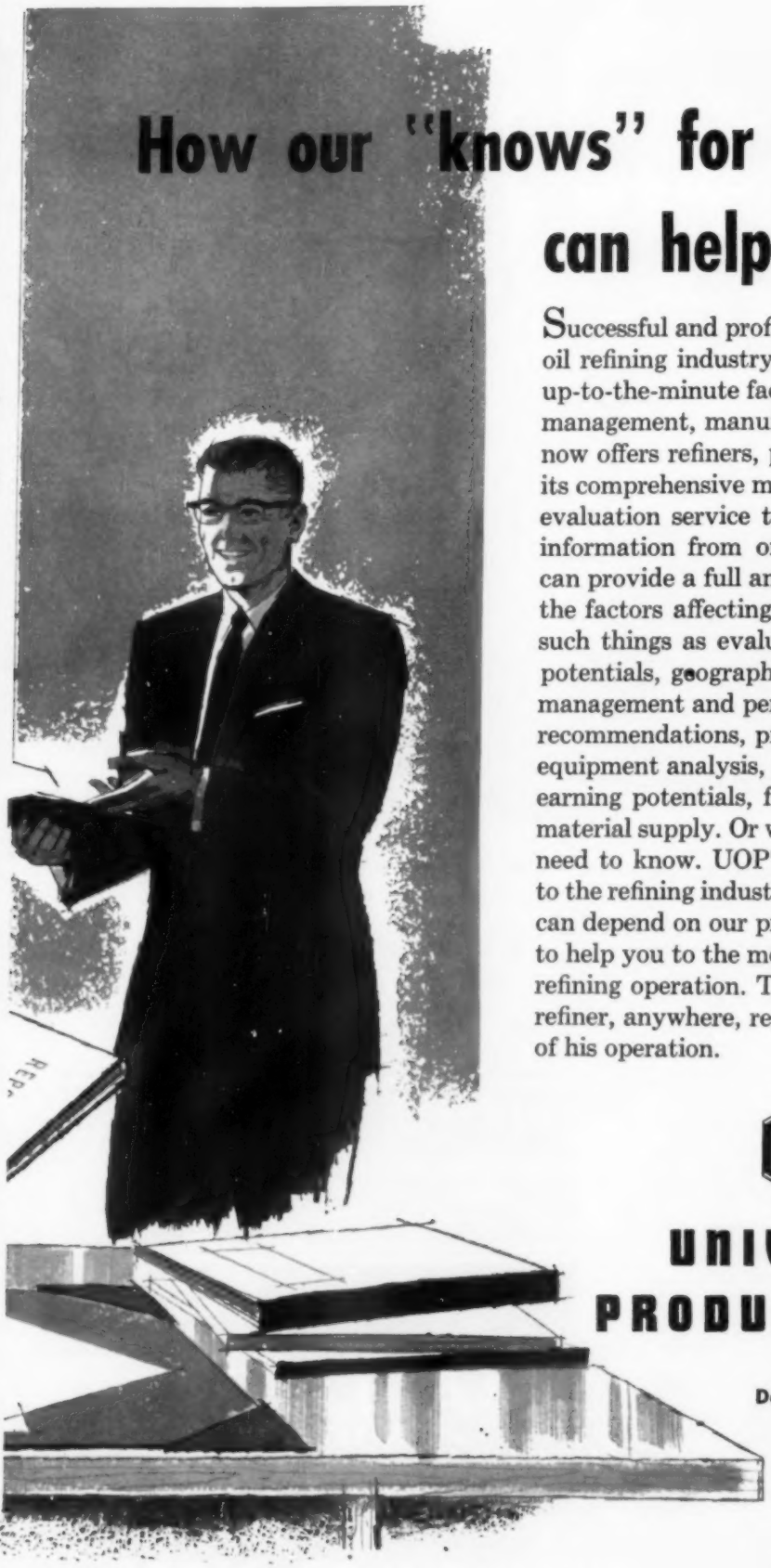
THE NATIONAL BANK OF

COMMERCE

Gulf Building, Houston, Texas **OF HOUSTON**

Facilities of The National Bank of Commerce Oil Loan Department are available in Wyoming, Nebraska, Colorado, New Mexico, Texas, Louisiana, and Mississippi.



How our "knows" for your business can help you

Successful and profitable operations in the oil refining industry depend on accurate, complete, up-to-the-minute facts about all phases of management, manufacturing and marketing. UOP now offers refiners, potential or established, its comprehensive market research and economic evaluation service to provide all essential information from one qualified source. This service can provide a full and accurate analysis of all the factors affecting a successful operation. It covers such things as evaluation of markets and potentials, geographic factors and marketing trends, management and personnel analysis, product recommendations, process application planning, equipment analysis, financial requirements, earning potentials, facilities, manpower and raw material supply. Or whatever "knows" you need to know. UOP's more than 40 years of service to the refining industry is good insurance that you can depend on our providing the facts and guidance to help you to the most efficient and effective refining operation. This service is available to any refiner, anywhere, regardless of the size or scope of his operation.

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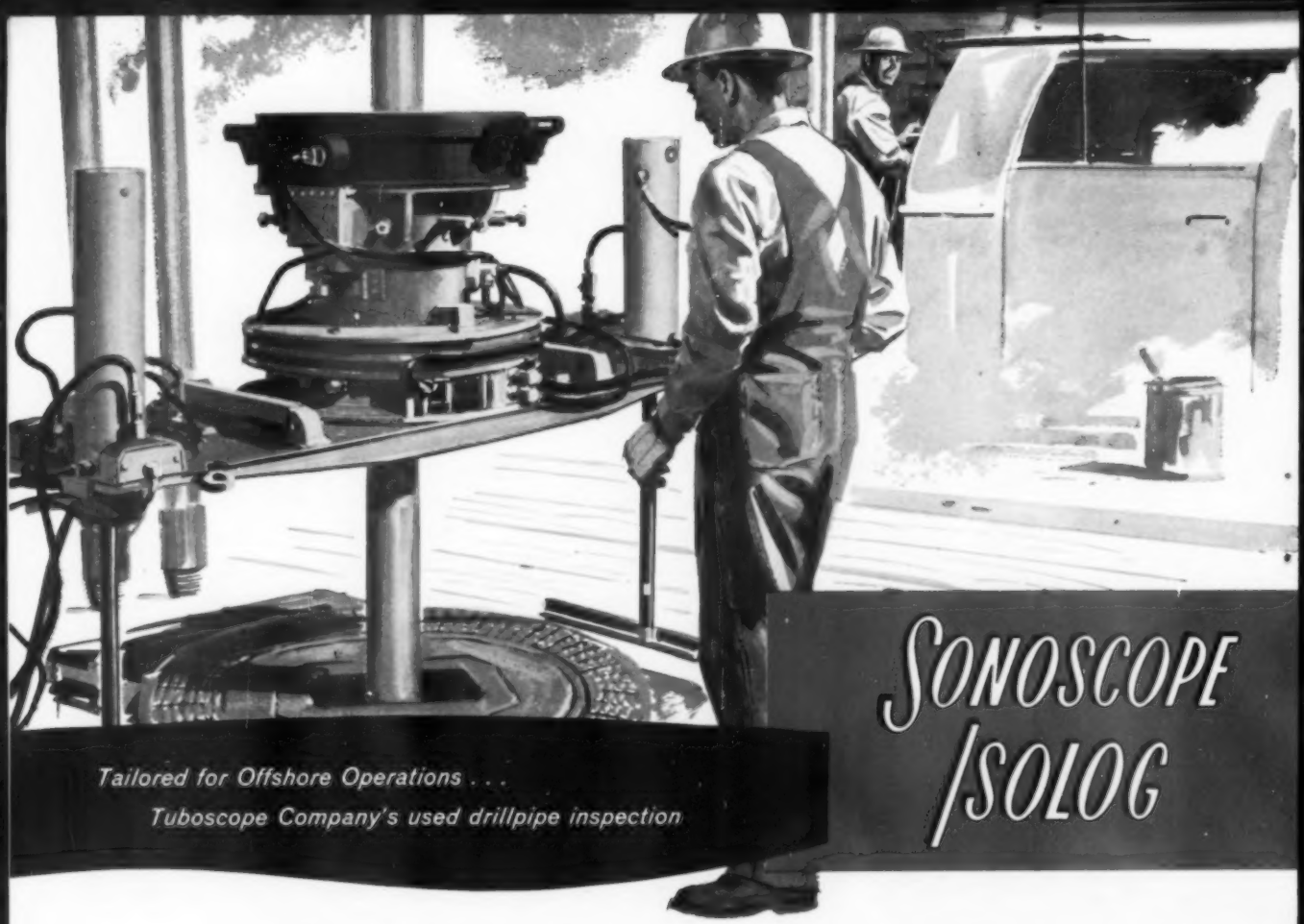


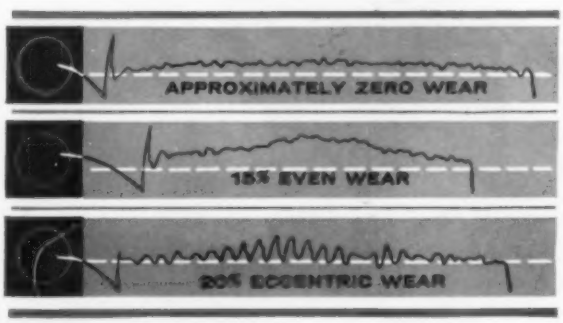
Tailored for Offshore Operations . . .
Tuboscope Company's used drillpipe inspection

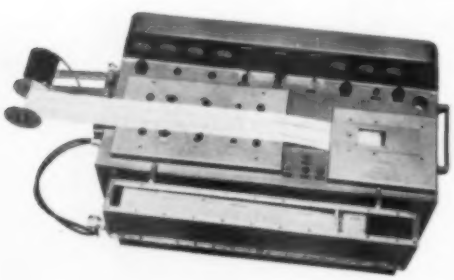
SONOSCOPE /SOLOG

Tuboscope's Isolog® measures and records wall thickness of drill pipe as it is being pulled from the hole. As the pipe is being pulled, a gamma ray beam is continually directed diametrically through it. Variations in pipe wall thickness cause corresponding variations in the amount of gamma rays passing through the pipe to a scintillation counter. These variations result in corresponding variations in the signal transmitted to the recorder, indicating relative wall thickness.

The standard Sonoscope® detects and records inside and outside surface discontinuities as the pipe is being pulled from the hole. When performing an Isolog-Sonoscope inspection, the operator, by scanning the logs being produced, quickly determines the effect of defects and wall thickness reductions on serviceability of the pipe.

- Measures wall thickness while coming out of the hole
- Detects fatigue cracks, corrosion, pits, cuts, etc.
- Detects internal structural conditions





Tuboscope COMPANY

2919 HOLMES RD.

HOUSTON, TEXAS

From Midget to Monster

WILLIAMS WRENCHES *fit the job**

In scale comparative illustration — Actual openings: Midget 3/16", Monster 3 1/8".

ALLOY WRENCHES

A complete selection from 33 patterns, 400 sizes with openings from 3/16" to 3 1/8". Drop-forged from selected alloy steel and heat-treated for maximum service. Quality chrome plated finish.

CARBON WRENCHES

From a tiny 2 1/2" to a giant 52 inches long — there are 29 patterns, 542 sizes with openings from 3/16" to 7 5/8". Correctly designed, they are made from selected carbon steel drop-forged and heat-treated for extra strength. Finish is black enamel.

***Over 95% of your wrench requirements are stock items in THE BROADEST LINE OF ITS KIND.**

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TOOLS OF INDUSTRY

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Under a subcont
and I would like to say the West Coast Division have on this job complied fully with the high standards of workmanship for which Midwest is known.

Throughout this entire project not once was a cut necessary to correct any piece of fabrication, and I might add in several instances close tolerances had to be met.

The above was not written on an impulse but as construction superintendent, this means but one thing: fast and low cost erection. Would appreciate your thanking Midwest personally for [illegible] from a construction

Excerpt from letter by:
HOLMES & NARVER • Engineers-Constructors
828 South Figueroa St. • Los Angeles 17

Note particularly the words "*fast and low cost erection*" in the above letter. They characterize Midwest Shop-Fabricated Piping . . . whether for refinery, power plant or industrial installations. In this instance they were written by A. H. Chamberlain, construction superintendent, upon completing the installation of a Houdriformer Unit at the U.S. Oil & Refining Co., Tacoma, Washington.

There are three well-equipped Midwest pipe fabricating shops located to serve economically all sections of the country. Each is staffed by a highly skilled organization using the latest techniques. Each has wide experience on all kinds of projects so that the possibilities and limitations of all piping materials are well understood. You too will find it to your advantage to call in Midwest whenever you need fabricated piping.

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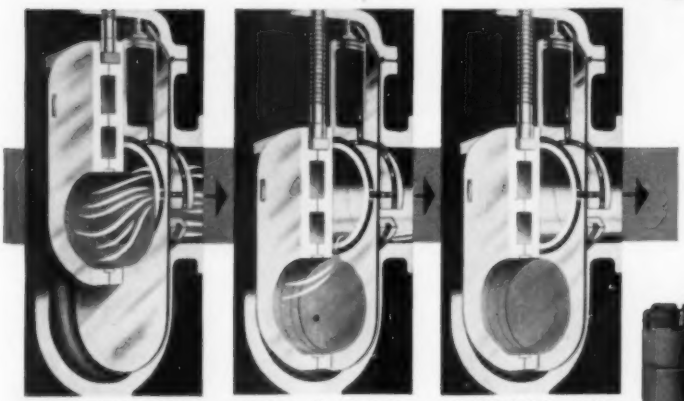
For pipeliners who hate leaks!

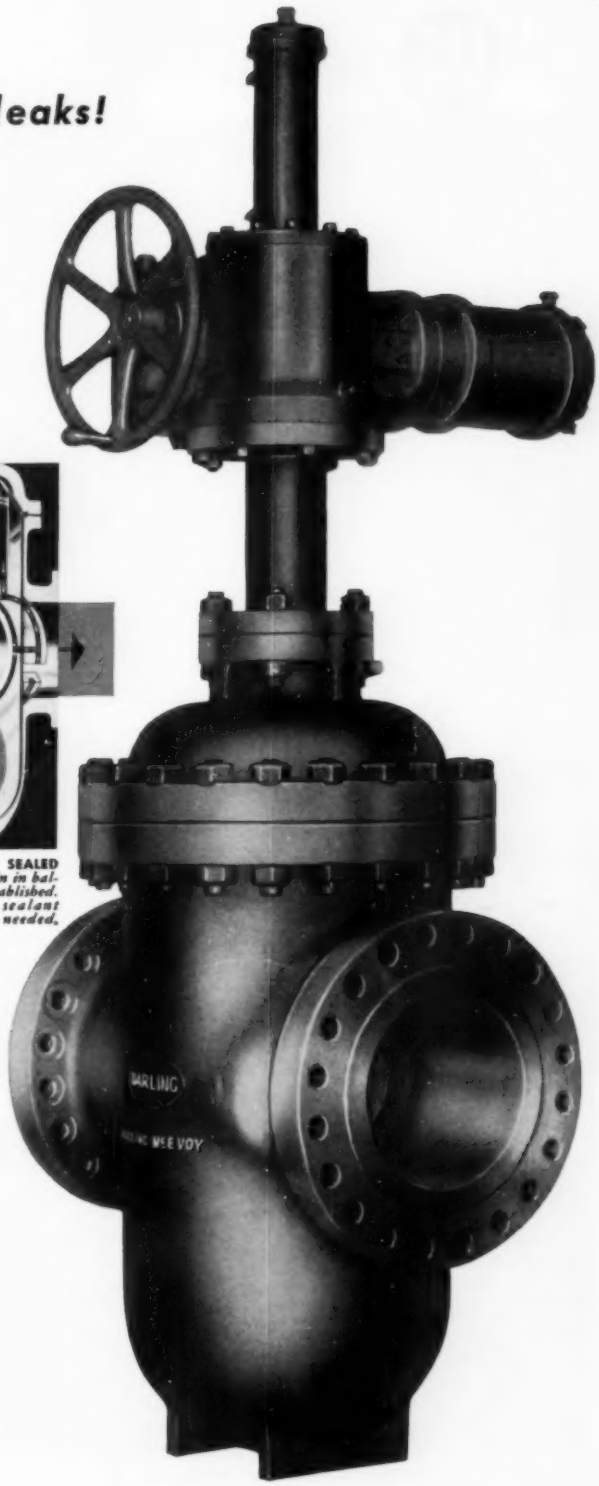
DARLING-McEVOY SELF-SEALING CONDUIT VALVES



APPROACHING CLOSURE ... *No loss of sealant as sealing groove in seat is disconnected from reservoir until gate is fully closed.*

CLOSED ... *Jumper in gate now permits differential pressure to feed sealant into seat groove to check any remaining flow.*

AUTOMATICALLY SEALED ... *Pressures again in balance. Tightness established. No additional sealant used until again needed.*



THE DIAGRAMS above show how these unique conduit gate valves seal themselves *automatically* . . . by means of a long lasting reservoir-held sealing compound . . . for leak-proof, pressure-tight closure every time! This feature, with flow in either direction, self-aligning non-wedging gates, and fully protected non-distorting seats, means exceptional performance, utility and service life. For additional information on these fully field-proved Darling-McEvoy valves, ask for Bulletin 5402.

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U. S. Matchless Steam Hose is used in steam lines in every kind of industry. For such a husky hose, it is extremely flexible and easy to handle. The tube is made of specially compounded stock to provide high resistance to heat; the carcass is of braided mild steel wire to give outstanding strength, flexibility and ductility; a synthetic rubber cover resists heat, oil and weather.

U. S. Matchless Steam Hose is obtainable at any of the 28 "U. S." District Sales Offices, at selected distributors, or write us at Rockefeller Center, New York 20, N. Y. In Canada, Dominion Rubber Co., Ltd.

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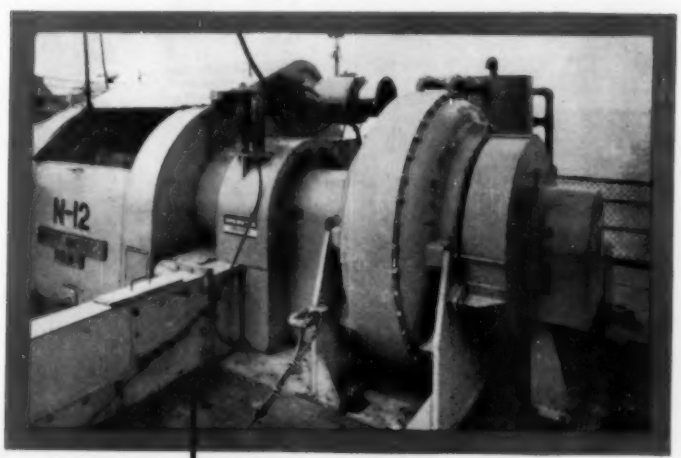

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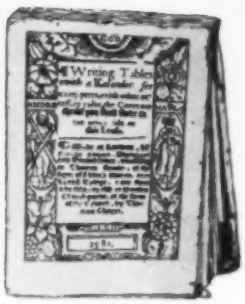
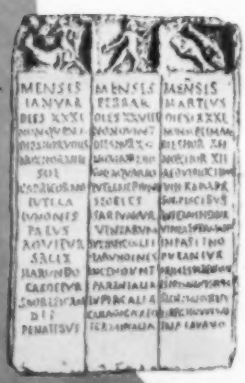
Scandinavian Calendar—Between 8th and 14th Centuries



English Tables—16th Century

Operating time of Clark Centrifugals

Roman Farmer's Almanac—1st Century A. D.



Saxon Calendar—About 6th Century

Aztec Calendar Wheel—Before 1479

totals 19 CENTURIES

Operating experience recorded by Clark centrifugal compressors totals 1,981 years. Providing rugged, reliable service 'round the clock, they have compiled this lengthy performance record within the actual time of only 10 years.

When Clark began to build centrifugal compressors a decade ago, pressures of 100 psi. were not considered practical. Today, as a result of Clark advanced engineering and design, Clark centrifugals are operating at over 5,000 psi. From the first, they have proved themselves in the field.

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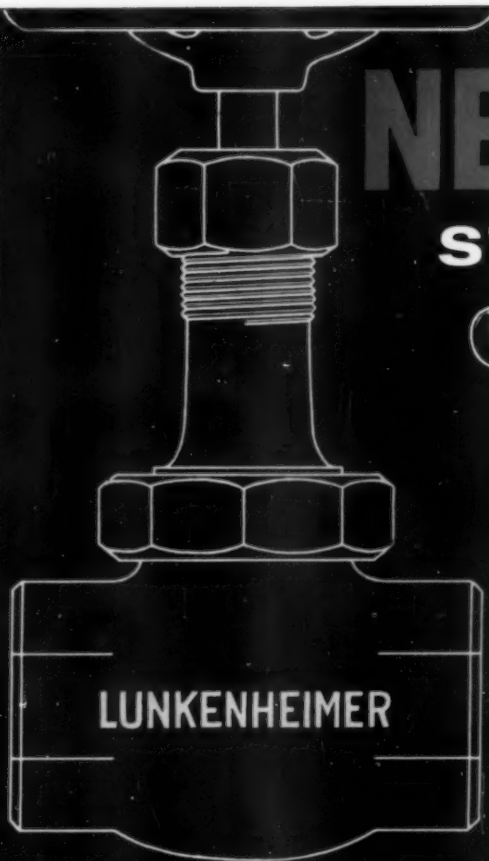
NEW LQ600
STANDS ALONE



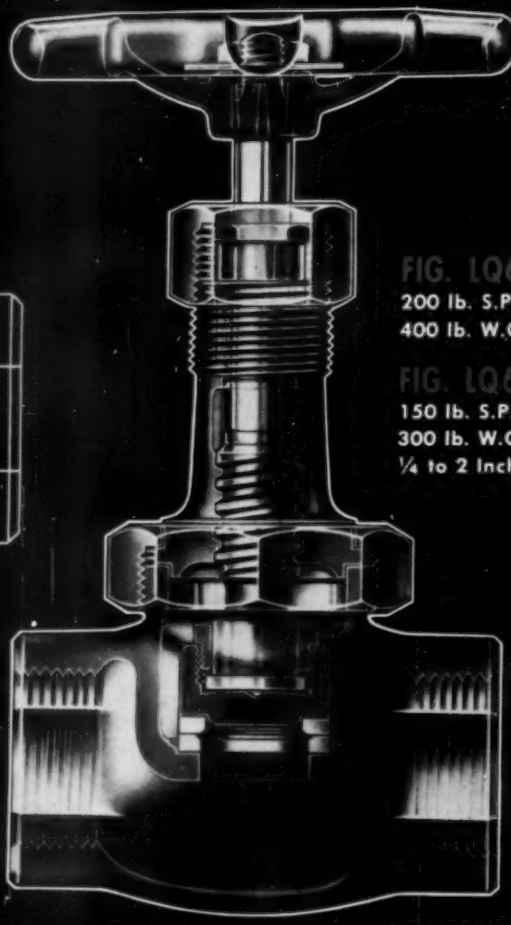


FIG. LQ600-200
200 lb. S.P.
400 lb. W.O.G.

FIG. LQ600-150
150 lb. S.P.
300 lb. W.O.G.
¼ to 2 Inches

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To combat today's high maintenance costs, install the best equipment you can buy. In valves, that means Lunkenheimer. The Lunkenheimer record-breaking LQ600 Bronze Globe Valve has set new standards of performance in industry after industry—standards that ordinary valves do not even approach much less equal.

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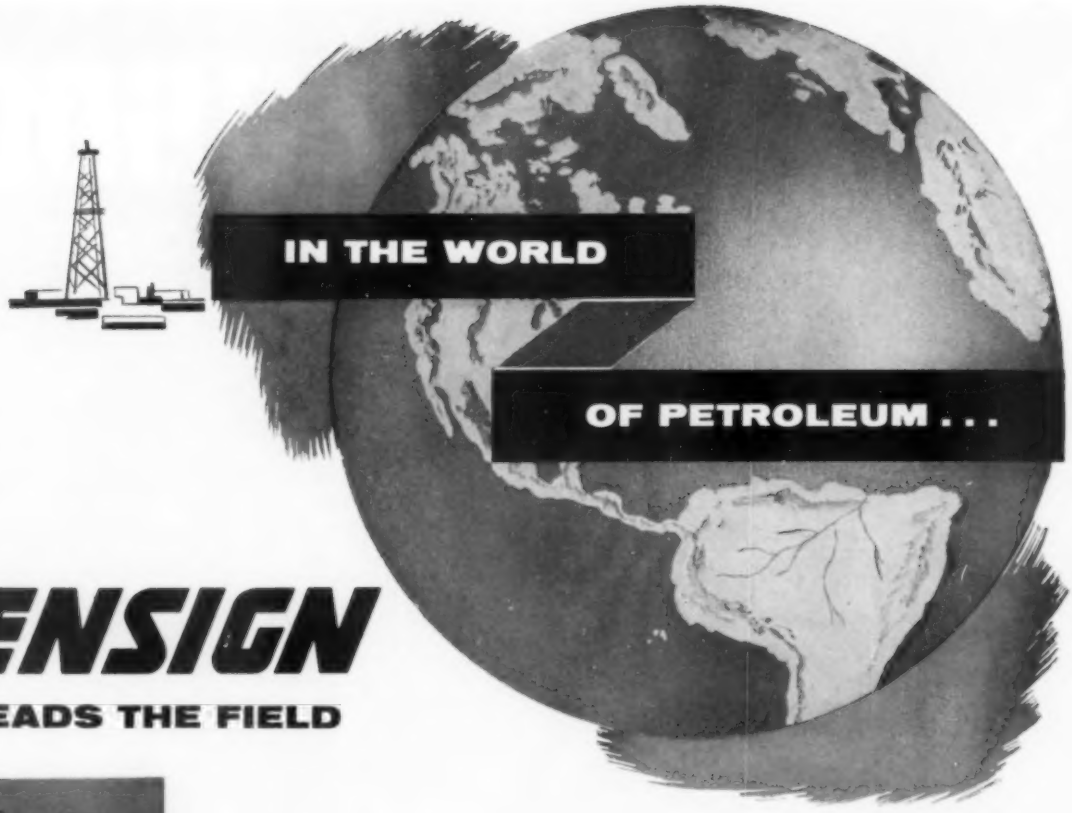

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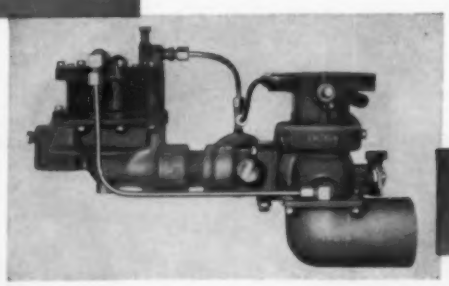

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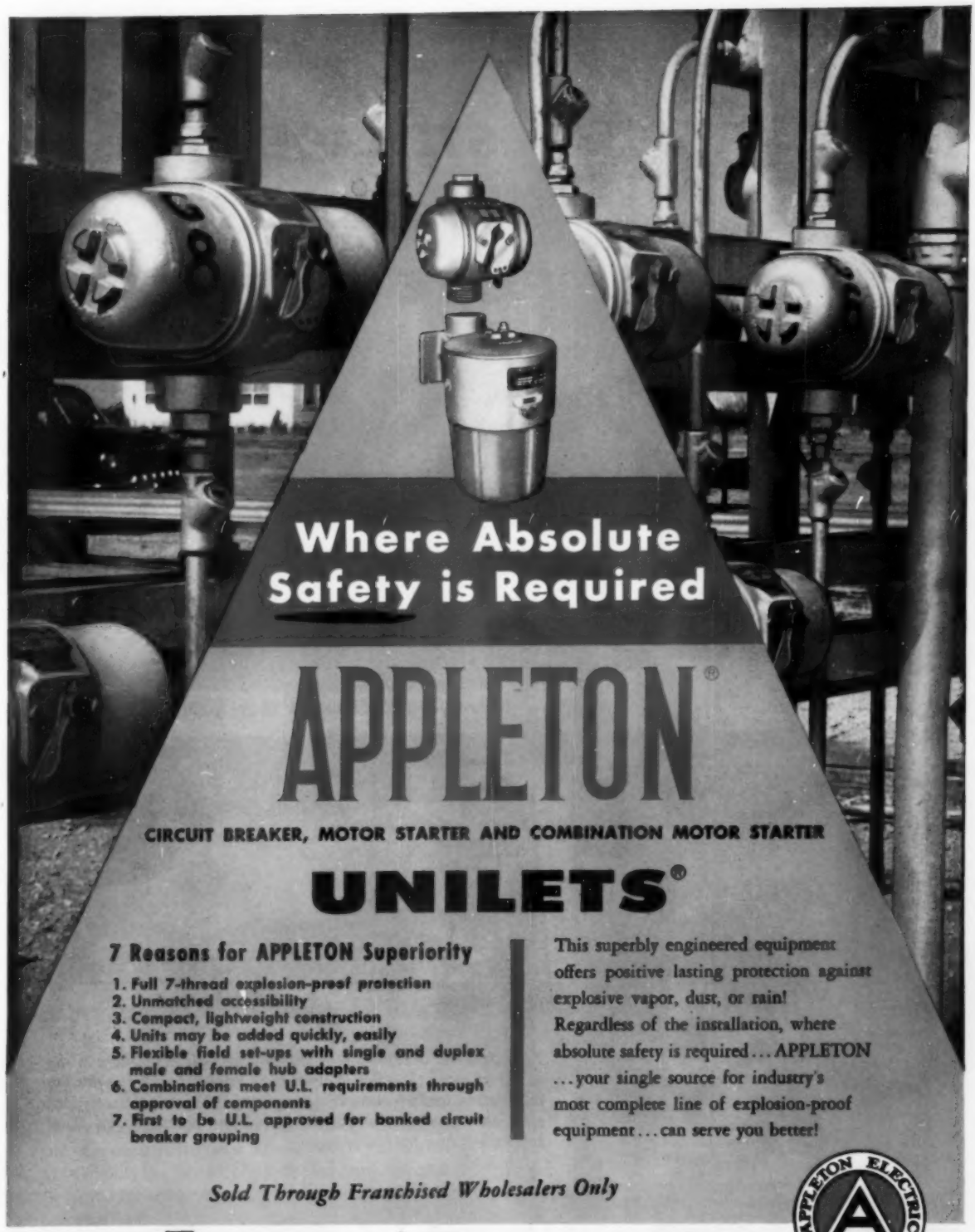
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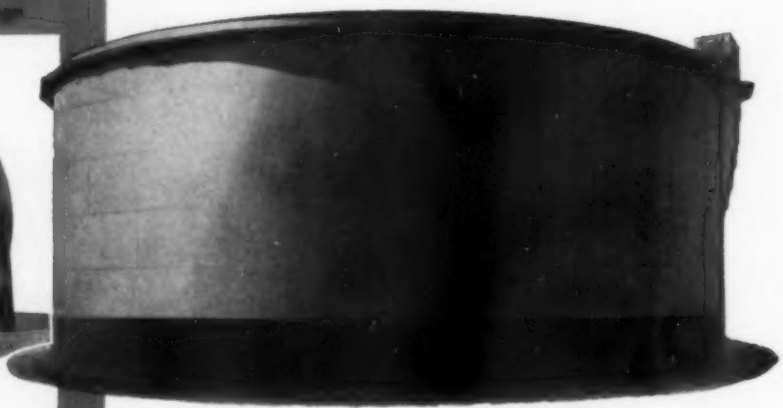
DIAMET* tank with vapor-saver diaphragm

Hammond Spheroid



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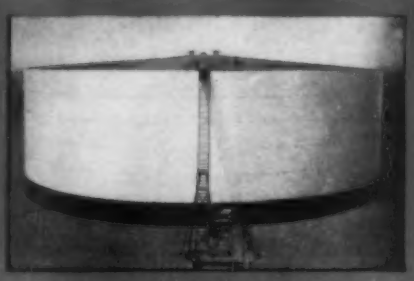

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KEY® RETURN BENDS– KEY-KAST FITTINGS in service at new Tidewater refinery

In Tidewater Oil Company's giant new Delaware Refinery, where "firsts" are commonplace, and "world's largest" describes many of the units, KEY products were chosen for their efficient, economical, long-lasting service.

The furnaces are equipped with KEY 5000 Type Return Bends. Their simple design, rugged construction mean dependable service. Only 26 parts for 18 different size fittings in two series mean substantial savings in inventory. In addition KEY 180° type "W" welding fittings were extensively used.

KEY-KAST alloy steel welding fittings in ells, tees and caps were furnished in schedules 40 and 80, sizes from 16″ to 24″, in low chrome moly steel.

KEY Return Bends and KEY-KAST fittings are bringing dependability and economy to refineries throughout the world. Specify KEY and KEY-KAST products for your next job.

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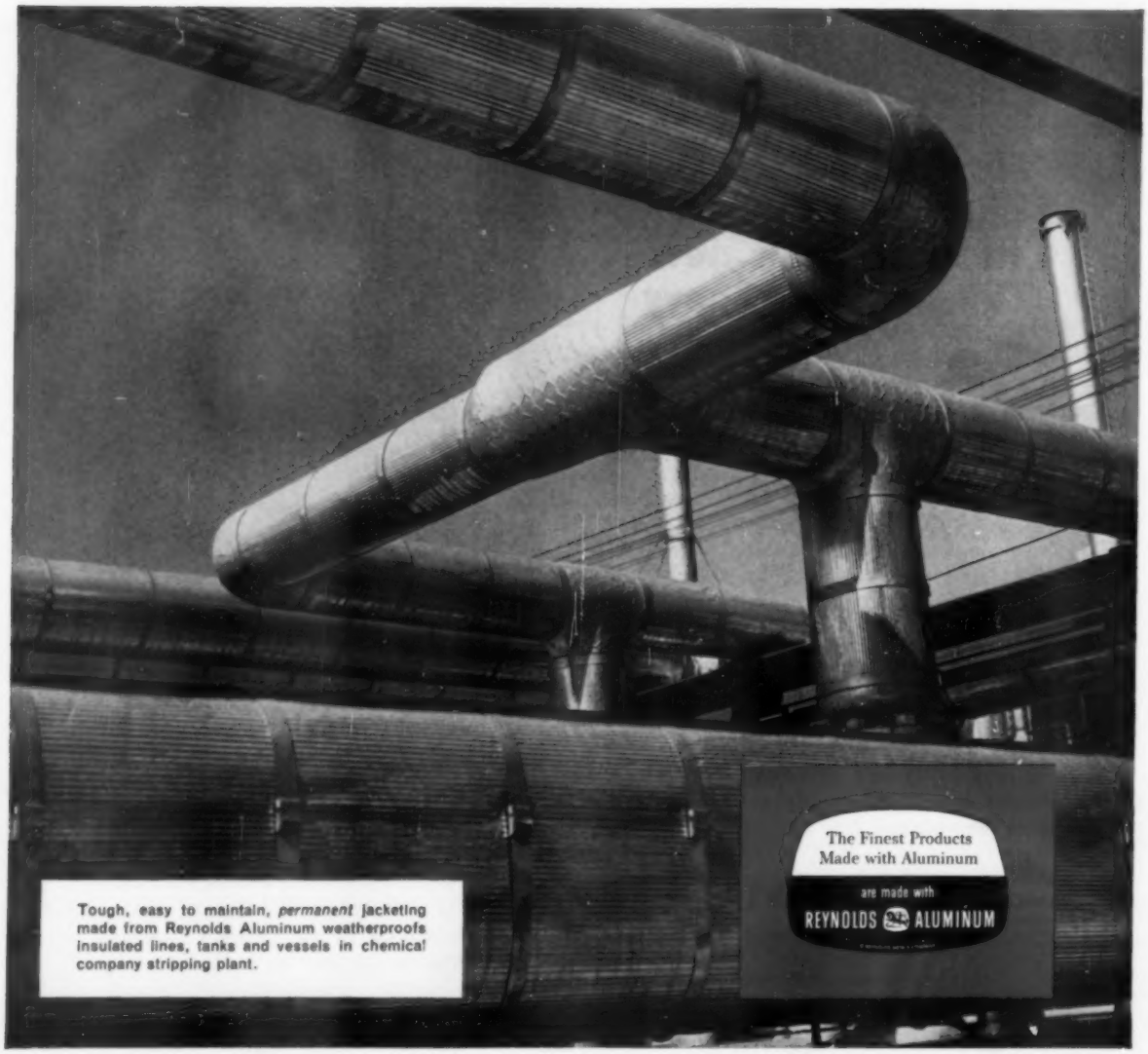
Aluminum Jacketing

...how it improves appearance, cuts installation, maintenance costs



Tough, easy to maintain, *permanent* jacketing made from Reynolds Aluminum weatherproofs insulated lines, tanks and vessels in chemical company stripping plant.

Aluminum is the one permanent jacketing material, a material that stays clean and new-looking with a minimum of upkeep. And that holds true in the toughest jobs in the chemical and petroleum processing industry. Jacketing made from Reynolds Aluminum cuts costs in many other ways, too. Here's how:

CORROSION-RESISTANCE

Many industrial atmospheres, chemicals, gases and contaminants literally eat jacketing materials away. But they don't bother aluminum. Reynolds Aluminum Jacketing stays strong, clean and rust-free in the most corrosive atmospheres, handling the most corrosive materials, in any climate or weather condition. *And it needs no repetitive maintenance.*

EASY TO INSTALL

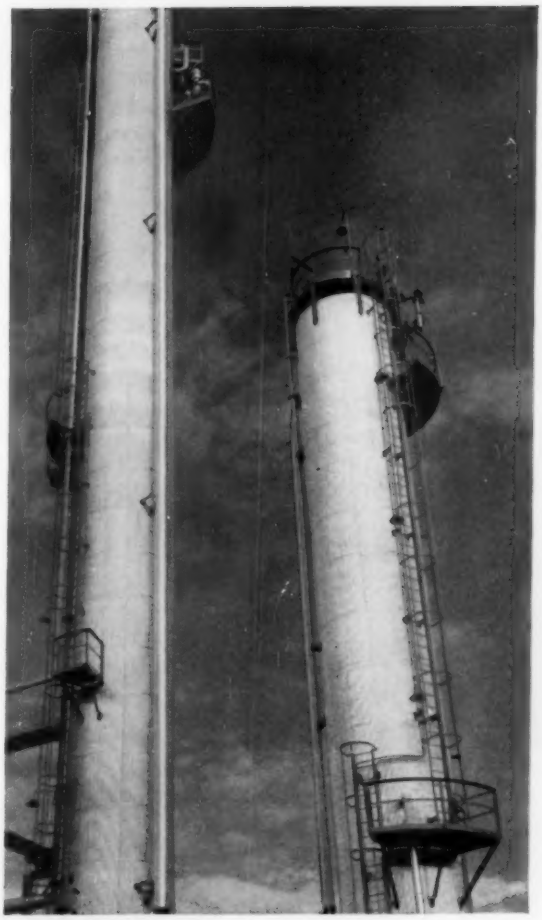
Lightweight aluminum is one of the most workable, formable of metals. That means faster, easier installation, and less time and labor on the site. You can cut and shape Reynolds Aluminum Jacketing with ordinary hand tools, and can use larger sheets because it is so light. Weighing only ⅓ as much as steel—or less—aluminum jacketing can save in shipping, handling, installation and supporting structure costs.

GOOD INSULATION PROPERTIES

Aluminum jacketing has a low factor of emissivity—it keeps heat *inside*—a big added advantage when you're handling or storing hot fluids. Then too, aluminum reflects as much as 95% of radiant heat. That means it protects volatile products from costly evaporation losses.

NON-SPARKING

Flammable and explosive materials are safer when aluminum is used for jacketing or handling equipment, because aluminum is non-sparkIng and won't burn.



Suntide Refining Co. tower in platforming and rexforming unit—jacketed in Reynolds Aluminum.

Of course, aluminum's properties are important to chemical and petroleum processing men in other applications as well as jacketing. In process pipe, for example, or oil country pipe, where Reynolds Aluminum's light weight and weldability saves hundreds of man-hours on installation. Tanks and vessels, heat exchangers, drilling rigs and offshore rigs are all using more and more aluminum, too.

For details on how Reynolds Aluminum can help you, or for technical service, call your local Reynolds office or write *Reynolds Metals Company, P.O. Box 1800-CR, Louisville 1, Kentucky; International Division, 19 East 47th Street, New York 17, New York.*

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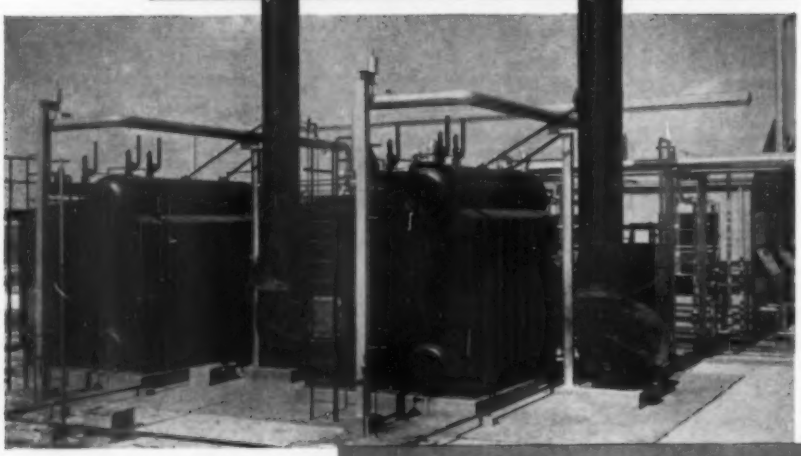
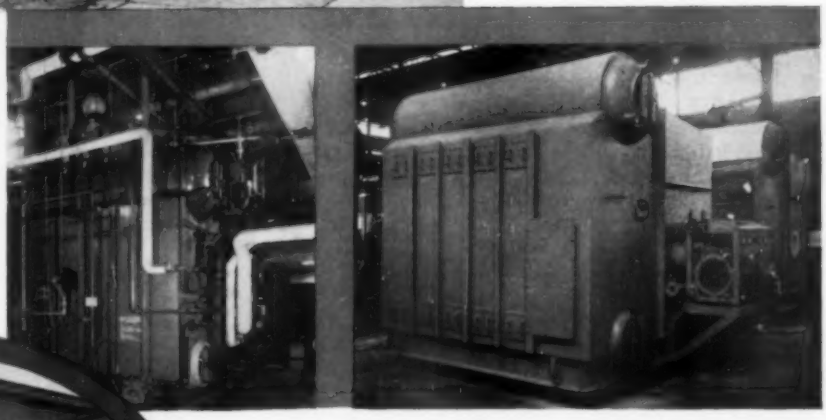
STEAM BOILERS *give* versatility with economy

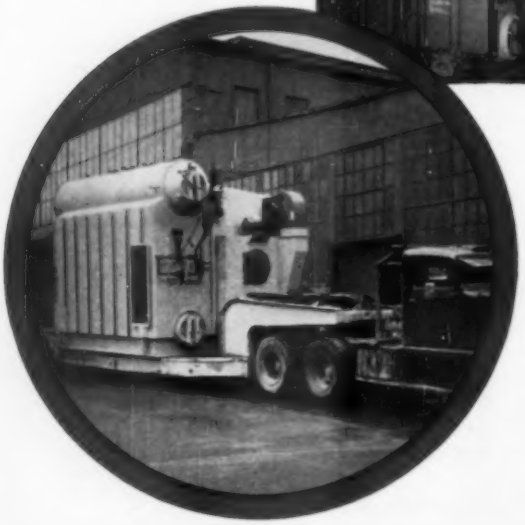


Above: Two units serve a gas pipeline company.

Left: Installation in fibre box-board plant.

Right: Unit for a leading soap manufacturer.





Enroute to an office building.

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For Dual String Completions – Flowing or Pumping

Use GUIBERSON'S RETRIEVABLE TYPE RD PACKER

Type RD Packer with Anchor and Plain Stinger

This cleanly designed, rugged packer is an outstanding Guiberson development for dual string installations in wells of any depth.

Outstanding in performance because it operates perfectly with both zones flowing, high or low differential pressure; with either zone flowing, the other zone pumping; with both zones pumping; with either or both zones on gas lift: or for multi-zone injection — gas or water.

Outstanding in advantages because it completely isolates each zone from the other and from the casing; provides full opening long string to lower zone; permits either string to be pulled or run separately.

Guiberson's RD packer does complex dual zone jobs so well that operators tell us it's their best investment for dual string production. Ask your Guiberson representative about installation and auxiliary equipment recommendations.

Guiberson's RD packer has smooth operating dovetail slips of heat-treated alloy steel. Packing rubber is one-piece sleeve type — will not vulcanize in the well, made of Guiberson's special oil and gas resistant compound. You can get the RD packer with or without anchor, and a choice of stingers, plain or with snap-ring. Piston slips have extra large gripping area, are heat-treated alloy steel and keyed to anchor body up to maintain proper alignment. Get the Best — Get Guiberson.

THE GUIBERSON CORPORATION

ESTABLISHED 1919
DALLAS, TEXAS
U. S. A.

Sold by Oil Field Supply Stores Everywhere

NOW!... for your refinery

A 3-WAY CHOICE

for putting the

TRETOLITE DESALTING PROCESS

in operation

Tretolite desalting, the first all-chemical desalting process, is now available to you in a choice of plans, one of which is certain to fit into your operation and financial policies:

1 Standard Proposal

The Tretolite Company furnishes a list of the equipment required, instructions for installation and, working drawings, designed to tie in with the flow stream in the customer's refinery. Data on the rate of Tretolite injection for optimum desalting results, operating instructions, temperatures, pressures and water requirements are also included. Tretolite Refinery Service Engineers check construction procedure to insure that installation is according to specifications; they also assist with start-up and make periodic visits after the unit is in regular operation.

2 Outright Purchase

The Tretolite Company ships the desalting plant equipment to the refinery. Erection is then carried on by refinery personnel or by an erector of the customer's choice. Inspections during construction, start-up assistance, and periodic inspections are provided by the Tretolite Refinery Service staff as in plan No. 1. When the desalting plant is ready to go on stream, Tretolite Refinery Service Engineers supervise an acceptance test run to meet the guarantee of minimum chemical requirements and salt removal efficiency as set forth in the contract.

3 Rental with Option to Purchase

The rental plan is similar in all general respects as to instructions, supervision and materials furnished in plans No. 1 and No. 2. After acceptance requirements have been fulfilled, the pre-determined annual rental fee is payable according to the payment option selected by the customer.

After the plant has been operated for three years on the rental basis, the customer has the option of purchasing the equipment for a pre-determined price. (This price is reduced after each year's rental.) After a unit has been used on a rental basis for seven years, the annual rental fee is reduced about 50%.

For additional information,

ASK THE MAN IN THE RED CAR

YD-58-1

Your Tretolite Refinery Service Engineer will gladly give you complete information on the various ways of acquiring Tretolite Desalting equipment, as well as operating and performance data on plants currently in service.

advantages of the

TRETOLITE DESALTING SYSTEM

- *Proved Performer.*
  Used to purify 1½ million barrels every day.
- *95 to 100% Salt Removal.*
- *Average Chemical Cost of 1.3 mills per Desalted Barrel.*
- *Automatic Operation.*

TRETOLITE COMPANY

DIVISIONS OF PETROLITE CORPORATION

[illegible]

Chemicals and Services for the Petroleum Industry

DESALTING • CORROSION INHIBITING • DEMULSIFICATION
SCALE PREVENTION • WATER DE-OILING • METAL DEACTIVATION • ADDITIVES

Regular in-store buyers have a wider variety of products to choose from, and usually have fewer supply "emergencies" in the field.

What's the best value in a National Supply Store?

There are 65,000 different items stocked among our 131 stores, but the very best value isn't a product. It's the man behind the counter.

He is well-trained, experienced and practical. He is familiar with operating problems in the area which his store serves. In addition to this practical knowledge of field operations and equipment, he has at his fingertips a large amount of technical information that you may often find very helpful.

Most important of all, the man behind the National Store counter is friendly, courteous and helpful; eager to serve you from the complete stocks available in the store —and well-equipped with all that it takes to make that service of real value to you.

The National Store men in your area are good folks to know. If you don't already know them, it will pay you to stop in and get acquainted.

The centralized controls on National Supply's new diesel electric rigs are easy to operate.

New National DIESEL ELECTRIC Rig designed for drilling to 25,000 feet!

...especially suitable for offshore service!

Here's the big first in a new series of National Supply Rigs designed for electric application! It's the 1625DE, built for drilling from 16,000 to 25,000 feet, using 1⅜″ or 1½″ wire line, and utilizing 1,300 to 2,000 horsepower delivered through electric motor drives.

In the 1625DE, you'll find all the field-proved features of National Rig construction combined with a simplified, highly flexible power package. Because of its light weight and compact hook-up, this completely integrated drilling system is a natural for offshore service, where platform space is expensive.

National's 1625DE draw works is basically a one-piece design on an 18-inch beam base. Its front and rear sections are detachable for easy transportation, and it includes these outstanding features:

Centralized controls—The draw works' continuously variable control and rotary torque control are centralized and simplified for easy operation. The flexibility of electric power permits infinite speed control with fewer steps on the draw works.

This is one of the offshore platforms on which a National 1625DE Rig is in service.

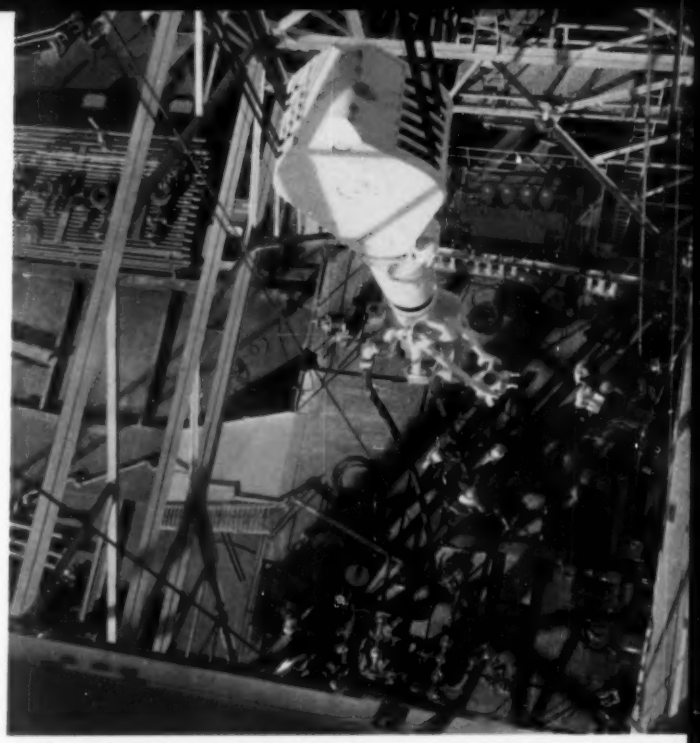
Four hoisting speeds—Transmission shaft carries two drives to the drum, and motor drive rear section includes primary shaft with two selective speed chain drives. Drives are arranged to obtain most efficient use of power and insure fastest operation in line with good drilling practice. Two speeds are available to catheads (and sand reel, if used) and rotary drive.

Large integrally grooved spooling drum—36″ x 61¼″ drum permits hoisting 135 ft. stands of pipe with eight lines without spooling more than three layers on the drum . . . has National Spirallel Grooving, surface-hardened at points of wear.

K-62 Compound Equalizing Brake—Designed especially for this size drum, this National drum brake is the most efficient one in the industry.

Air friction clutches—Used on the drum shaft to provide ease of operation and eliminate shock

continued next page



Overhead view of the rig at left shows more National equipment in service.

Dependable National Slush Pumps help keep mud system costs to a minimum.

New National DIESEL ELECTRIC Rig

(continued)

loading. A special National feature is a jaw clutch built inside the low drum clutch for standby purposes.

National Type A Catheads—Years of trouble-free service have proved the high quality of these important draw works elements.

Draw Works Electric Motor Drive—For the 1625DE, power may be two or three 625/650 h.p. DC motors or two 1,000 h.p. motors—coupled at the rear of the draw works.

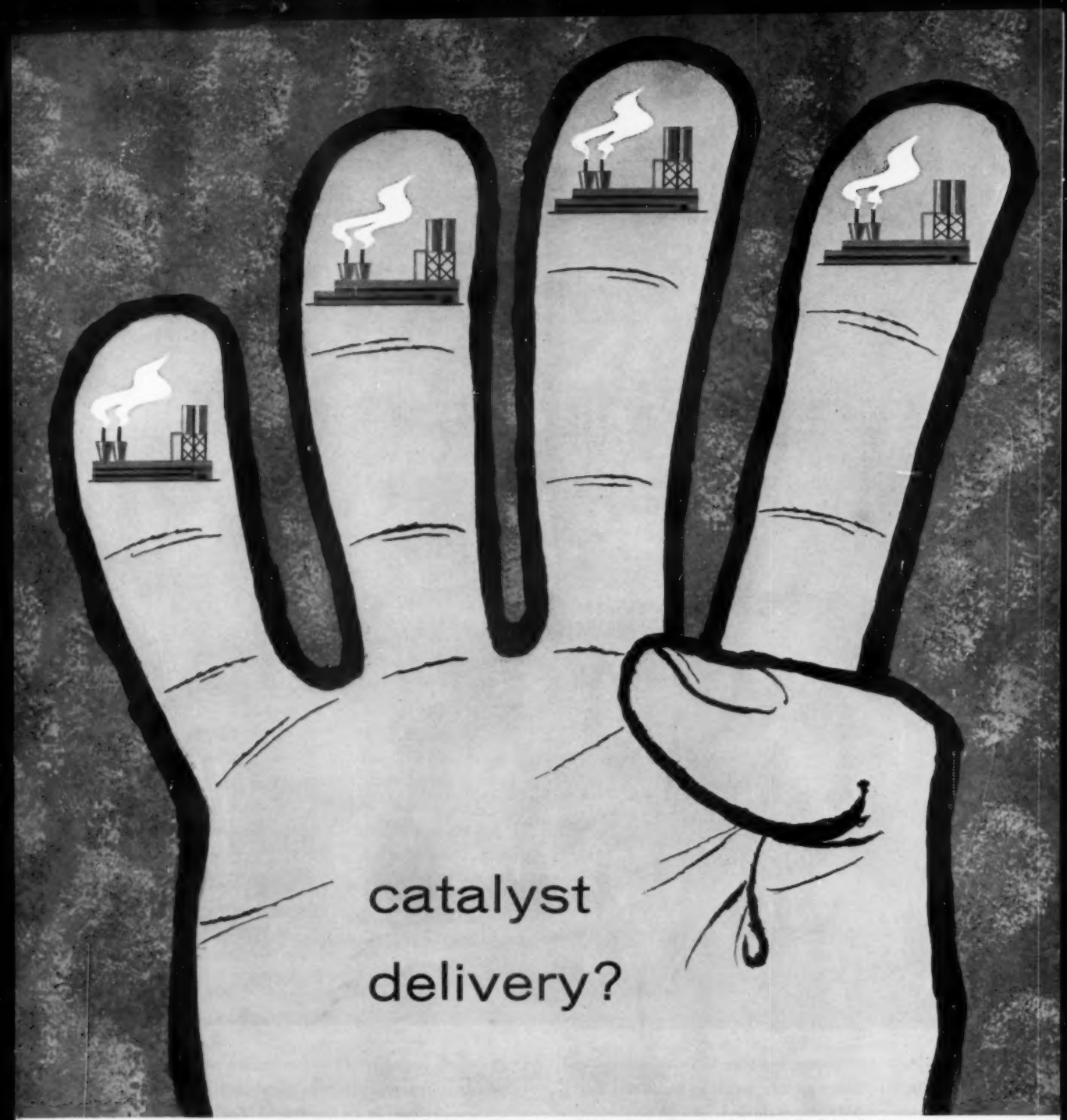
NATIONAL 1320DE RIG ALSO AVAILABLE!

The 1320DE is another diesel electric draw works available in the National line. It is designed for drilling from 13,000 to 20,000 feet, and incorporates the same outstanding features of the 1625DE. For complete information on either of these rigs, contact the National Supply representative in your area.

This is the drive group section that complements the 1625DE shown on the previous pages. National Drive Groups are factory pre-aligned, easy to hook up and tear down. Each section is a completely self-contained unit and adaptable to any power source of appropriate size.

THE NATIONAL SUPPLY COMPANY

MAIN OFFICE: Two Gateway Center, Pittsburgh 22, Pa.
DIVISION OFFICES: Dallas; Denver; Houston; Toledo; Tulsa; Torrance
CANADA: The National Supply Company, Ltd., 200 F. W. Clark Building, 709 Eighth Avenue, West, Calgary, Alberta
EXPORT: 600 Fifth Avenue, New York 20, N.Y., U.S.A.; City Wall House, Chiswell Street, London E. C. 1
NATIONAL BLUE OIL FIELD MACHINERY AND EQUIPMENT
SPANG STEEL PIPE AND ELECTRICAL CONDUIT



Davison catalyst plants are located in Baltimore, Md.; Cincinnati, Ohio; Lake Charles, La.; affiliated plant in Valleyfield, Quebec.

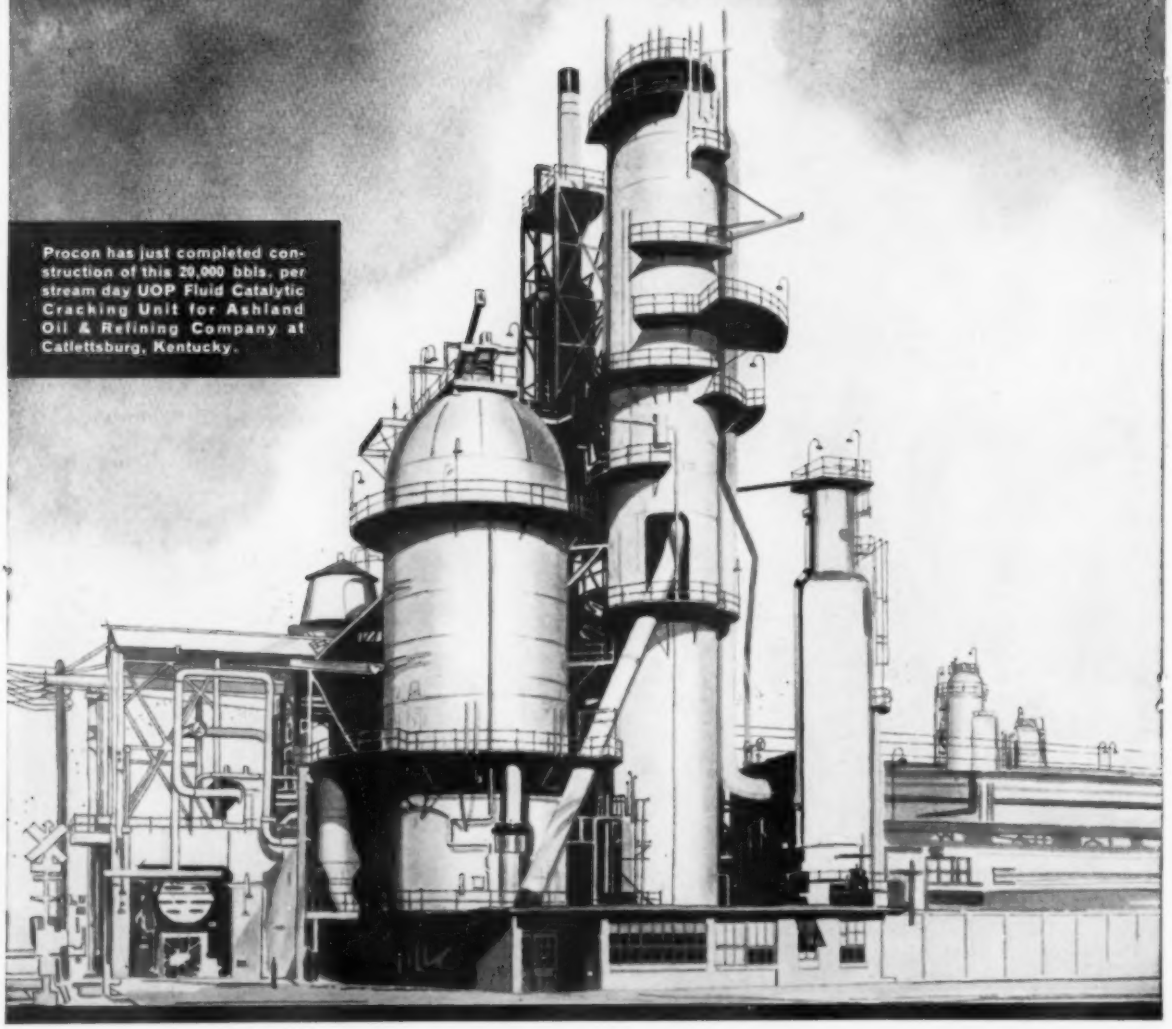
Four—count 'em—four catalyst plants back up Davison's claim of quick service

Fact: Davison has more plants producing petroleum catalyst than any other manufacturer. Fact: There is a Davison plant within easy shipping distance of most of the nation's refineries. Fact: Each plant is on main transportation arteries so shipments can be made by rail, truck, ship or barge. Conclusion: Davison delivers catalyst where—and *when*—you want it.

DAVISON
CHEMICAL COMPANY
Division of W. R. Grace & Co.
Baltimore 3, Maryland

Buy DAVISON—the quality catalyst backed up by experience, research, technical assistance, service!

True satisfaction in building comes only with the finished job



Procon has just completed construction of this 20,000 bbls. per stream day UOP Fluid Catalytic Cracking Unit for Ashland Oil & Refining Company at Catlettsburg, Kentucky.

Here at Procon we take a lot of satisfaction in all phases of our work as builders. Everything we do, from designing and engineering through each stage of construction, gives us that feeling of accomplishment which is so rewarding a part of any job well done.

We only get our fullest measure of satisfaction, though, when the job is finished, faithfully done to every requirement of specification and time.

Procon's experienced organization plans and builds refineries, petrochemical and chemical plants anywhere in the free world. You can count on any project you trust to Procon being completed to your true measure of satisfaction, too.

PROCON *Incorporated*

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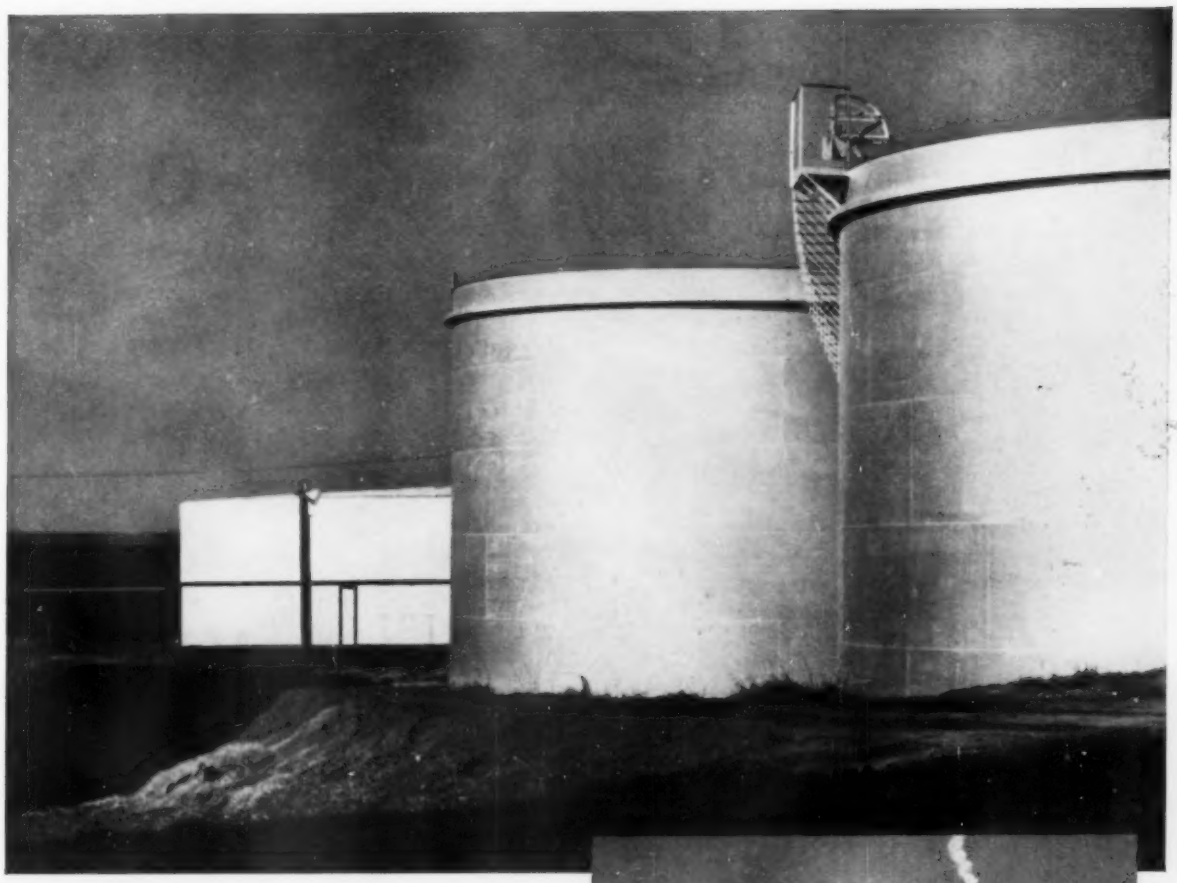
WORLD-WIDE CONSTRUCTION FOR THE PETROLEUM, PETROCHEMICAL AND CHEMICAL INDUSTRIES



The Answer to Low Vapor Losses When Throughput Is High

Graver's assignment for this refinery included the following tankage: seven double-deck floaters, eleven cone roofs and one Graversphere®.

Minimizing vapor losses, particularly when daily throughput is high, can substantially increase refinery profits. Prominent in the refinery above are seven modern Graver Double-Deck Floating Roof Tanks, long proved most effective with Graver's Vapor-Stop Seal in controlling vapors. The double-deck design eliminates standing losses and minimizes filling losses. In hot sunshine, the double deck offers important insulating advantages. In heavy rain or snow, the double deck provides additional buoyancy and stability for the roof. Drainage is positive—to a sump in the center. When you figure Graver Double-Deck Floating Roof Tanks for your product storage, you are assured of the most efficient tank of this design that you can buy. May we prove this?

GRAVER®

Building for the Future on a Century of Craftsmanship in Steels and Alloys

GRAVER TANK & MFG. CO., INC.

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New York • Philadelphia • Edge Moor, Delaware • Pittsburgh
Detroit • Chicago • Tulsa • Sand Springs, Oklahoma • Houston
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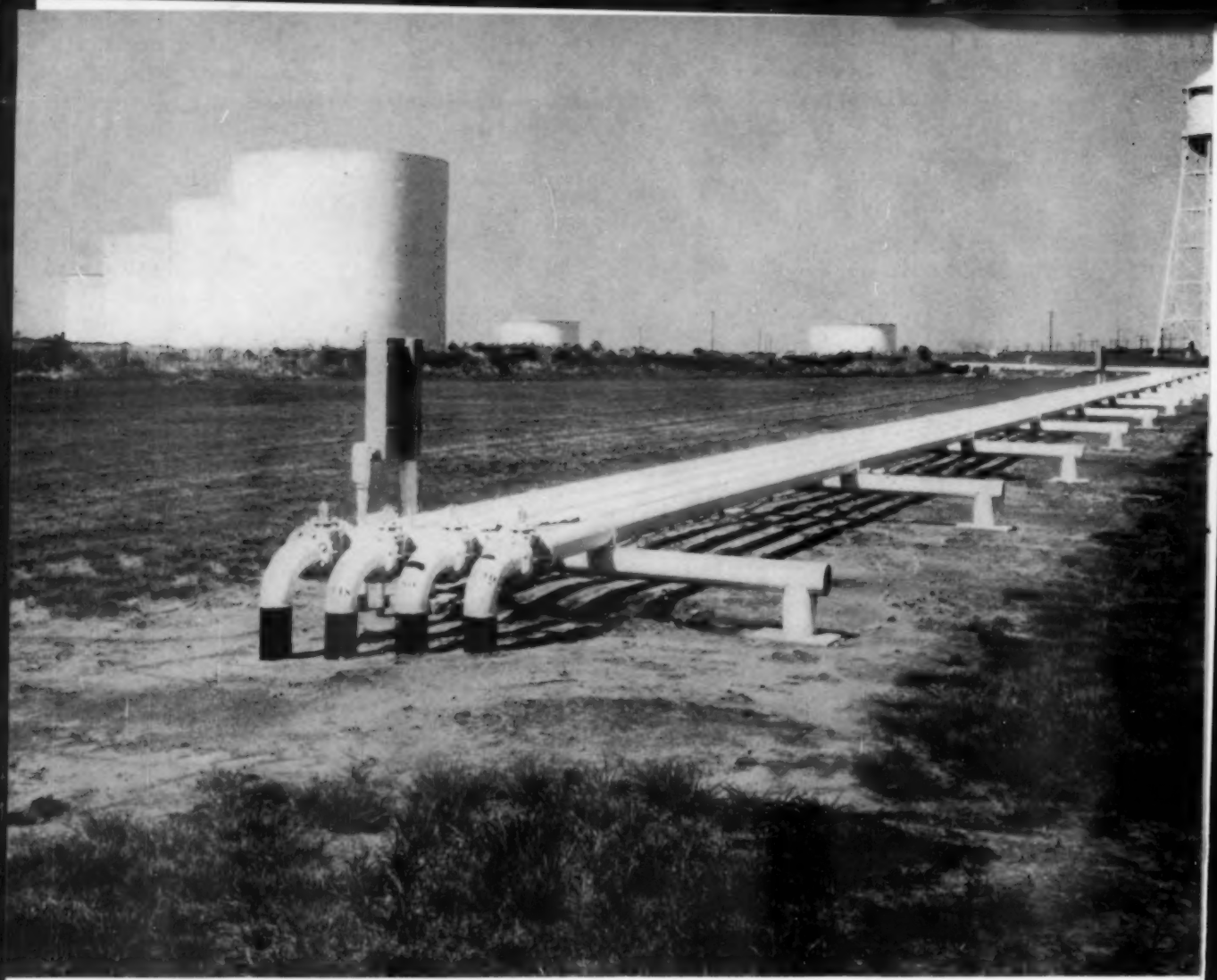


Note the complete control of vegetation with "Telvar" around these overground lines of Phillips Petroleum Company. "Telvar" was applied in March, photo taken four months later. Around pipelines, refineries, tank farms and producing wells, "Telvar" eliminates fire-hazardous vegetation.

Avoid fire hazards
Reduce maintenance costs—control weeds all season with one spraying

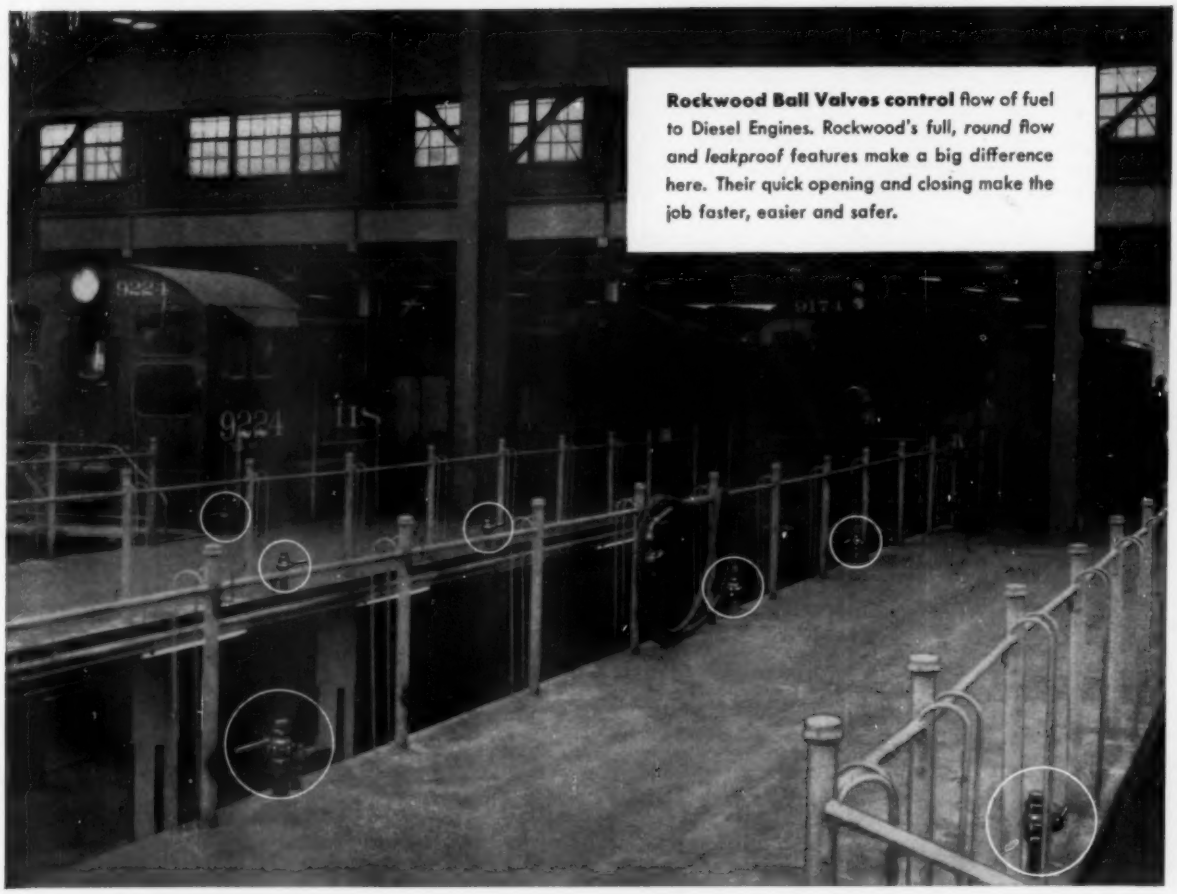
Now you can eliminate weeds and grasses that create fire hazards and make maintenance difficult. Just one application of Du Pont "Telvar" weed killer controls weeds for a season or longer. "Telvar" kills weeds through the roots . . . remains in the soil to provide residual action. Easy to handle, economical to use. Be sure to specify "Telvar"... for long-term weed control!

On all chemicals, follow label instructions and warnings carefully.

DU PONT
REG. U. S. PAT. OFF.
BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

TELVAR®

MONURON AND DIURON WEED KILLERS



Rockwood Ball Valves control flow of fuel to Diesel Engines. Rockwood's full, *round* flow and *leakproof* features make a big difference here. Their quick opening and closing make the job faster, easier and safer.

Flammable liquids handled with safety ... without leakage ... without delay

Rockwood Ball Valves are ideal for handling flammable fuel oils. They handle quickly, easily! The reasons are —

Rockwood Ball Valves with *Full Round Flow* eliminate turbulence and provide minimum friction loss.

Only a quarter turn is needed to open or close the valve.

Rockwood Ball Valves have a chrome-plated ball that holds up under tough abrasion, pitting and scratching — that means *Long Wear-Resistance.*

Rockwood exclusive corrugated spring design and the pressure of the fluid *automatically* position the ball against the seat for a completely *Leakproof Seal.*

These features pay off on handling fuel oils. Rockwood Ball Valves deliver flammable fluids at the volume you want quickly, without leakage and a minimum of maintenance. The only other thing you could ask for is more information — and the coupon below will get it for you.

Tested and listed by Underwriters' Laboratories, Inc. Distributors in principal industrial areas.

ROCKWOOD BALL VALVES

FULL, ROUND FLOW

ROCKWOOD

ROCKWOOD SPRINKLER COMPANY
2210 Harlow Street
Worcester 5, Mass.

Send me illustrated folder V-4 on Rockwood Full-Flow Ball Valves.

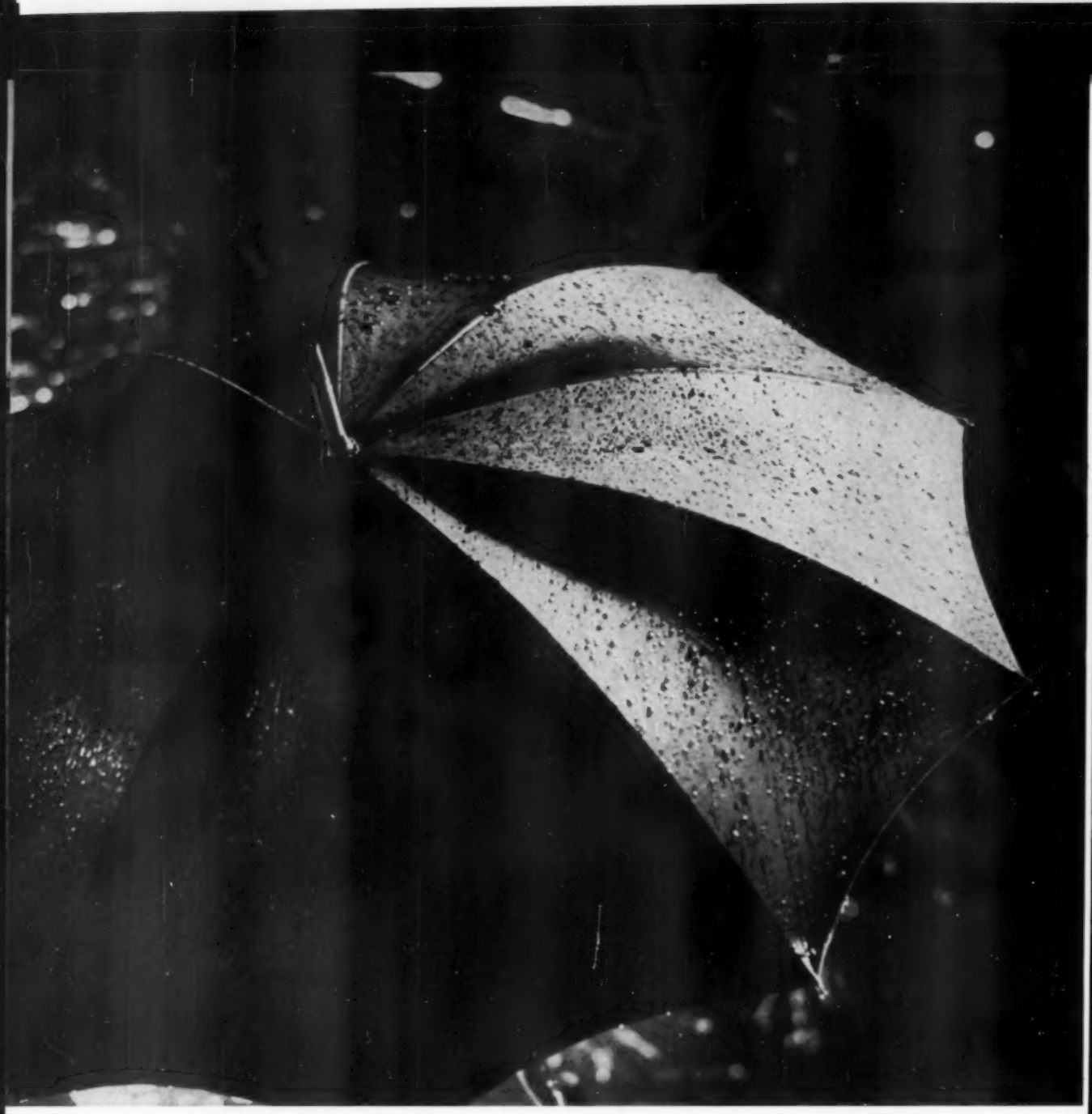
Name.....

Title.....

Company.....

City.....

Zone..... *State*.....



GPE — technological bumbershoot

Covering the advanced needs of industry and defense is today's biggest technological job.

GPE has brought together, under one umbrella, broad physical resources plus a remarkably creative group of scientists, engineers and technicians. Its co-ordinated skills, knowledge, experience and producing facilities cover more than a dozen industries.

Each company in General Precision Equipment Corporation works close to the frontiers of science in its specific fields. Working together, they have rolled up an impressive record of achievement in new and often uncharted technological areas.

If your needs are in controls, systems engineering or automation, you'll find some eye-opening answers in this highly integrated research, design, engineering and manufacturing group.

GENERAL PRECISION EQUIPMENT CORPORATION

The principal GPE companies cover needs of defense and industry in these areas: Audio-Visual, Automatic Controls and Automation, Aviation, Chemical Processing, Electronic and Electrical, Graphic Arts, Instrumentation, Marine, Motion Picture, Packaging, Paper, Petroleum, Photo Technology, Power Generation and Conversion, Printing, Steel, Television, Textile.

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SHAND AND JURS GPE
Strong GPE

Address inquiries to:
General Precision Equipment Corporation
92 GOLD STREET, NEW YORK 38, N. Y.

They Say—

Costly water pollution

Dear Sir:

I congratulate you on the splendid article in the February 17 edition of The Oil and Gas Journal, outlining the millions that are being spent by refineries in the fight against air pollution.

I realize that air pollution is probably a more timely subject and has received more national publicity than has one of the other industry pollution problems—salt-water disposal. However, for each dollar we are spending on the air pollution fight I feel sure the producers are spending hundreds of dollars in salt-water disposal systems. Here in Louisiana we have another problem, that of disposing of drilling-rig effluent. I would be very much interested in a similar type of article regarding what the producing industry is doing to avoid any kind of water pollution.

If any of your people choose to work on that in this part of the country, we would like to make available to you the facilities of the Pollution Control Committee of this organization which has been very active for a number of years in regard to this problem . . .

Charlie S. Wilkins
Executive Vice President,
Mid-Continent Oil and Gas Association
Baton Rouge, La.

Data is or data are?

Dear Sir:

My favorite publication has let me down, and with a bang too. I am not aware of just who is responsible for the article appearing on page 90 of the February 24 number, but in my book, the idea of "this mice is" is unusual to say the least.

I refer to the third sentence under the right hand picture, wherein appears this remarkable statement: "This data is." And it refers to some work done by my old company too, namely Esso. Need I state, "these data are?"

Some of us old retired fellows have much time on our hands, and we spend it perusing your efforts. So tighten up a bit, please.

R. W. Miller
St. Petersburg, Fla.

(Editor's note: We're saved by Webster on this one. The dictionary now says "although plural in form, 'data' is not infrequently used as a singular; as, 'this data has been furnished for study'.")

Proration spirals prices

Dear Sir:

Texas refiners are requesting import permits while Texas producers are limited to 9 days production a month. The restriction on production is according to market demand. Market . . . means market at a price. There obviously is a market for cheap imported crude.

We are also told that the price, although too high for the market, is less than the cost of finding, developing, and producing crude oil. This is probably true but have we considered how much production restrictions themselves raise costs?

Production restrictions raise costs because time is money. To stay in business we need a gross profit of at least 12 per cent and probably over 15 per cent on net capital investment. Part of this goes to federal income taxes, part to make up for the inadequacy of depletion and depreciation allowances, part for a reserve against higher costs of finding and producing oil in the future, part to investors, but it is all needed to keep operating.

Recent studies of the cost of finding oil and recent sales of oil properties both indicate that $1 is a very conservative cost for oil in the ground ready to produce. Assuming the maximum efficient rate of production of this oil is 7 per cent a year, we must invest at least $15 for each barrel of annual production. If we need 12 per cent gross profit to stay in business, we should add 12 per cent of $15—$1.80—to the cost of every barrel of oil for financial costs. If market demand proration forces us to limit production to 5 per cent a year, we need $20 worth of oil in the ground for each barrel produced. Financial costs become 12 per cent of $20 or $2.40 a barrel.

A very moderate restriction on production has forced us to ask 60 cents more a barrel to stay even financially. Labor and other costs of production are also higher when working on a 9-day per month schedule. Without making any very reckless assumptions it is easy to show excess costs, directly due to limitations on production, which are greater than the difference in price between imported and domestic oil and which are also greater than the proposed tariffs of $1 a barrel or 30 per cent ad valorem.

By limiting production to market demand—market at a price—we have

Designed for the Petrochemical Industry

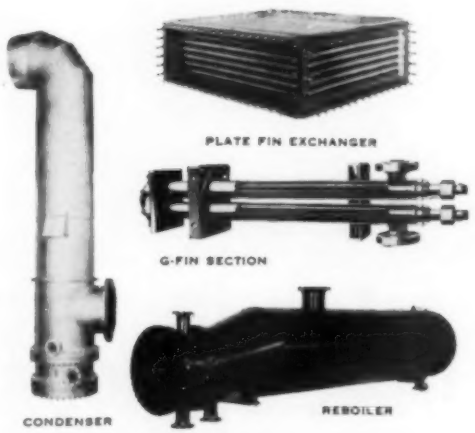
Proved in over 500 installations

Griscom-Russell fin-fans, by eliminating the cost of water, pumps, piping, valves, water treatment and maintenance, are the economical heat exchangers for many petrochemical cooling and condensing services.

G-R **fin-fans** are designed of the highest quality components to fit your special application. The transfer area is made of G-R's strong, helically finned tubing for highest efficiencies. Exceptional design and pre-fabricated construction minimize installation and maintenance expenses.

fin-fans are available in forced or induced draft designs with a wide range of capacities. Many accessories are available to solve special drive, control and weather problems.

Send for Griscom-Russell Bulletin 2400.



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built up some expensive excess producing capacity. We have also created a price umbrella for imports. Industry-wide production control for the purpose of maintaining price is contrary to the American theory of free enterprise. It is done legally only for farm products and oil. If we believe our own theories, should we be surprised that oil production and agriculture are sick phases of the economy?

George Gibson
Montclair, N. J.

(Editor's note: Reader Gibson brings straight to the front some of the vital factors confronting the drilling, producing, refining, and marketing industries. Certainly the petroleum industry must be a healthy one, and to be so, it must energetically cope with the problems of crude-oil replacement costs, the necessity of proper depletion and depreciation of reserves, and the import question. What do other readers say?)

We move a Venezuelan city

Dear Sir:

Greatly enjoyed reading your excellent summary of drilling conditions in Venezuela ("Looking at Venezuela for Opportunities?", O&GJ, Feb. 3, p. 76). However, would you please advise the draftsman who puts Barquisimeto smack in the middle of the State of Yaracuy to "Go west, young man, go west?"

E. H. Wenberg
Mene Grande Oil Co.
Caracas, Venezuela

CALENDAR

MARCH

26 Petroleum Equipment Suppliers Association, southwestern district meeting, Shamrock-Hilton Hotel, Houston.

26-28 American Power Conference, sponsored by Illinois Institute of Technology, Hotel Sherman, Chicago.

27 Commercial Chemical Development Association, annual New York meeting, Statler Hotel, New York.

27-29 American Institute of Mining, Metallurgical, and Petroleum Engineers, Pacific Southwest conference, St. Francis Hotel, San Francisco.

28-29 AIME Student Paper Contest, sponsored by Oklahoma City and University of Oklahoma chapters of Society of Petroleum Engineers of AIME, University of Oklahoma, Norman, Okla.

29 North Texas Oil and Gas Association, annual meeting, Kemp Hotel, Wichita Falls, Tex.

31-April 2 American Petroleum Institute, Division of Transportation, annual pipe-

for heavy duty
CORROSION PROTECTION
in the petroleum industry

PHENOLINE 305

- 85% solids content
- Needs only 2 coats (12 mils)
- Gives 2-3 times longer life, eliminates 1-2 recoating cycles
- Costs less to apply
- Can be brushed or sprayed

Phenoline 305 forms a tough, non-porous maintenance coating for protection against the corrosive effects of crude oil and salt water, and for reducing paraffin deposition in tubing. Also a heavy-duty coating for offshore rigs, tankers, barges and other marine equipment.

Here's rugged, heavy-duty, long-lasting maintenance protection against severe corrosive conditions. And because fewer coats give greater thickness, Phenoline 305 actually costs less than many so-called "cheaper" protective coatings. Use CARBOLINE's ENGINEERING APPROACH — compare cost per sq. ft. per year of service.

Write today for Bulletin 600 with complete information on this superior heavy-duty corrosion protection — Phenoline 305.

carboline COMPANY

32-F Hanley Industrial Ct.
St. Louis 17, Mo.

Manufacturers of
PHENOLINE, POLYCLAD,
RUSTBOND PRIMERS

PHENOLINE 305

Allis-Chalmers dozers

Here a 94-belt hp, 24,800-lb. HD-11 dozes out a slush pit. By pulling one lever, operator can shift from any of the six forward speeds to any of the three reverses. By using the high-speed reverse, he can back up in a hurry—convert maneuvering time to production time.

hog dirt out quick on oil field jobs

Ramming out slush pits, leveling drill sites, carving access roads, building fire walls—whatever the job, you get high production with an Allis-Chalmers crawler tractor-dozer package.

Here is why. Because each dozer is designed specifically for the tractor it mounts on, you get a unit that is exactly the right size with maximum strength without excess weight. Dozer is mounted in the right location to provide a balanced tractor-dozer package with high dirt-moving ability under any terrain or job condition.

Proper blade curvature keeps dirt "live" and rolling for bigger loads with less tractive effort. Specialized grading and sloping jobs are handled accurately with easy-operating pitch and tilt adjustments.

Allis-Chalmers dozers are tough

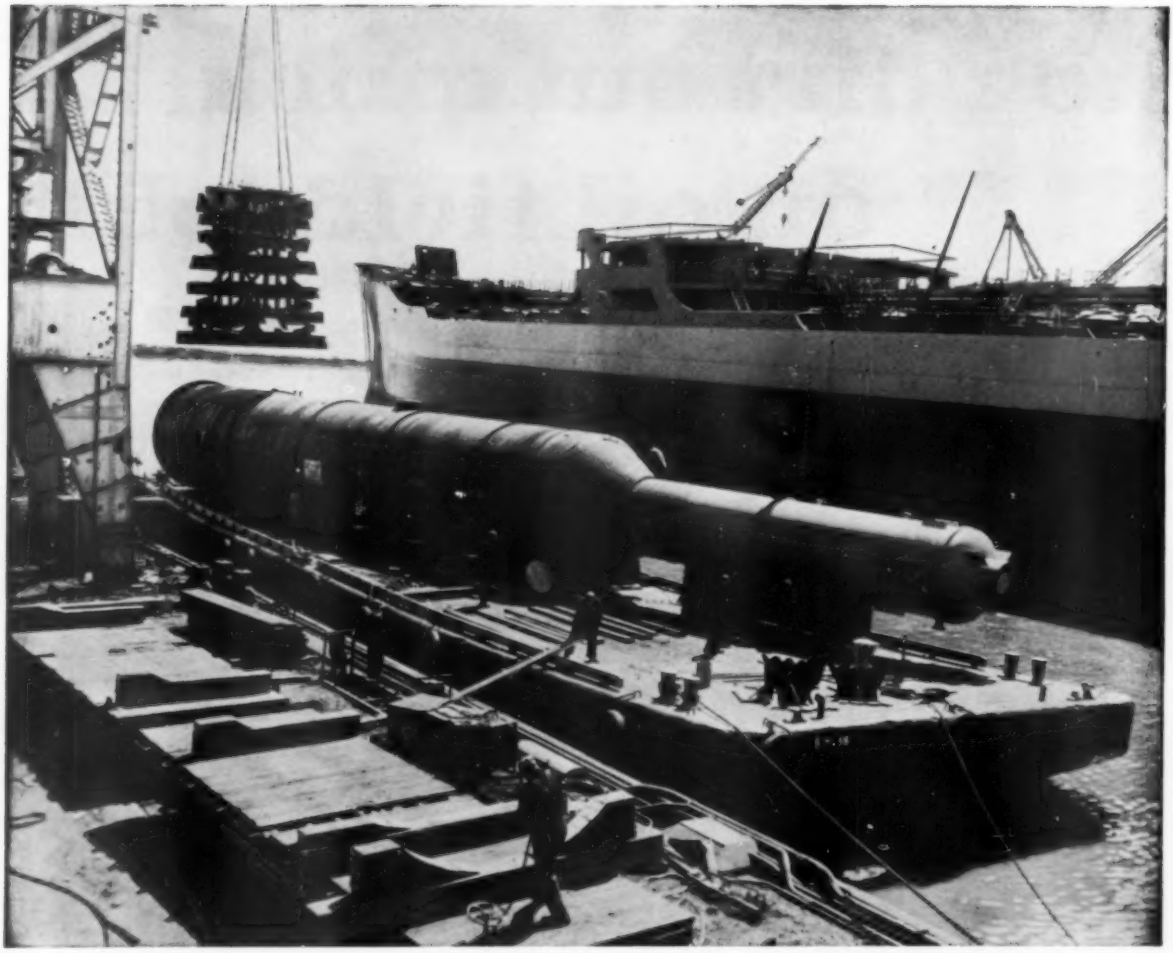
These long-life dozers are the product of the latest design and manufacturing techniques. Automatic electric welding, line boring of brackets, and proper reinforcing assure lasting alignment. All possible points of wear—trunnions, pin connections, ball and socket joints—are hardened to keep the dozer "tight" even after long hours of hard work.

Matched to a great crawler line

Allis-Chalmers crawlers are designed to give you big-money dirt-moving performance. Powerful Allis-Chalmers engine, all-steel Box-A Main Frame, unit component construction, new ceramic-lined master clutch, new extra-tough track are just a few of the reasons why. Your nearby Allis-Chalmers dealer can point out many more.

ALLIS-CHALMERS, CONSTRUCTION MACHINERY DIVISION, MILWAUKEE 1, WISCONSIN

ALLIS-CHALMERS



standard procedure: VERSATILITY...

The variety of work which Sun Ship's integrated shops produce for use by industries on land and sea brings a matching variety of shipping problems.

Our facilities for tidewater shipment are used to economical advantage on many of the massive structures that go into the making of the nation's petroleum and chemical industries. The barge shipment of tower and shed row baffles, shown above, is a good example.

And of course—when shipment by land is necessary—Sun Ship rigging and routing find the ways and means to handle such items as large-diameter columns by rail and truck.

It's all a part of the versatility which forty years' experience has made part of "standard procedure" in service of its customers.

Our Sales Engineering Department would be glad to use its experience in helping you overcome any problem of construction or shipment that faces you. Write

Sun

SHIPBUILDING & DRY DOCK COMPANY

ON THE DELAWARE SINCE 1916 CHESTER, PA.

line conference, Jung Hotel, New Orleans.

31-April

2 American Institute of Electrical Engineers, southwest district meeting, Mayo Hotel, Tulsa.

APRIL

1-3 University of Oklahoma, fifth annual conference on corrosion control, Extension Study Center, Norman, Okla.

2 Petroleum Equipment Suppliers Association, eastern district meeting, Duquesne Club, Pittsburgh.

8 American Institute of Chemical Engineers, Philadelphia-Wilmington section, University of Pennsylvania, annual meeting, University of Pennsylvania campus, Philadelphia.

8-9 Gas Compressor Institute, sponsored by University of Kansas and Southwest Kansas petroleum industry, Randall's Cafeteria, Liberal, Kans.

9-11 American Petroleum Institute, Division of Production, Mid-Continent district meeting, Biltmore Hotel, Oklahoma City.

13-18 American Chemical Society, national meeting, San Francisco.

15-17 University of Oklahoma, thirty-fourth annual gas measurement short course, North Campus, Norman, Okla.

15-18 American Welding Society, annual meeting and welding show, Kiel Auditorium, St. Louis.

16-18 Natural Gasoline Association of America, annual convention, Baker and Adolphus Hotels, Dallas.

6-18 National Petroleum Association, fifty-fifth semiannual meeting, Hotel Cleveland, Cleveland.

17 Petroleum Equipment Suppliers Association, Pacific district meeting, Beverly-Hilton Hotel, Los Angeles.

17-18 Texas Technological College, fifth annual West Texas oil lifting short course, Lubbock, Tex.

17-18 American Institute of Mining, Metallurgical, and Petroleum Engineers, Louisiana-Arkansas, East Texas, and Mississippi petroleum sections, gas technology symposium, Shreveport, La.

17-18 Geophysical Society of Tulsa, Tulsa Geological Society, annual midwestern exploration meeting, Tulsa.

17-19 American Institute of Mining, Metallurgical, and Petroleum Engineers, Pacific Northwest regional conference, Spokane, Wash.

20-23 American Institute of Chemical Engineers and Chemical Institute of Canada, chemical engineering division; Canada-U.S. chemical engineering conference, Montreal.

21-23 American Petroleum Institute, Division of Production, Rocky Mountain district meeting, Cosmopolitan Hotel, Denver.

23-25 Second International Williston Basin Symposium, sponsored by Saskatchewan Geological Society and North Dakota Geological Society, Regina.

27-30 American Association of Petroleum Geologists, Rocky Mountain section, Casper, Wyo.

28-29 University of Oklahoma, third annual conference on automatic control in the petroleum and chemical industries, Oklahoma Memorial Union Building, Norman, Okla.

28-29 Independent Petroleum Association of America, mid-year meeting, Sherman Hotel, Chicago.

28-30 Southern Gas Association, annual convention, Dallas.

29-May

1 Petroleum Industry Electrical Asso-

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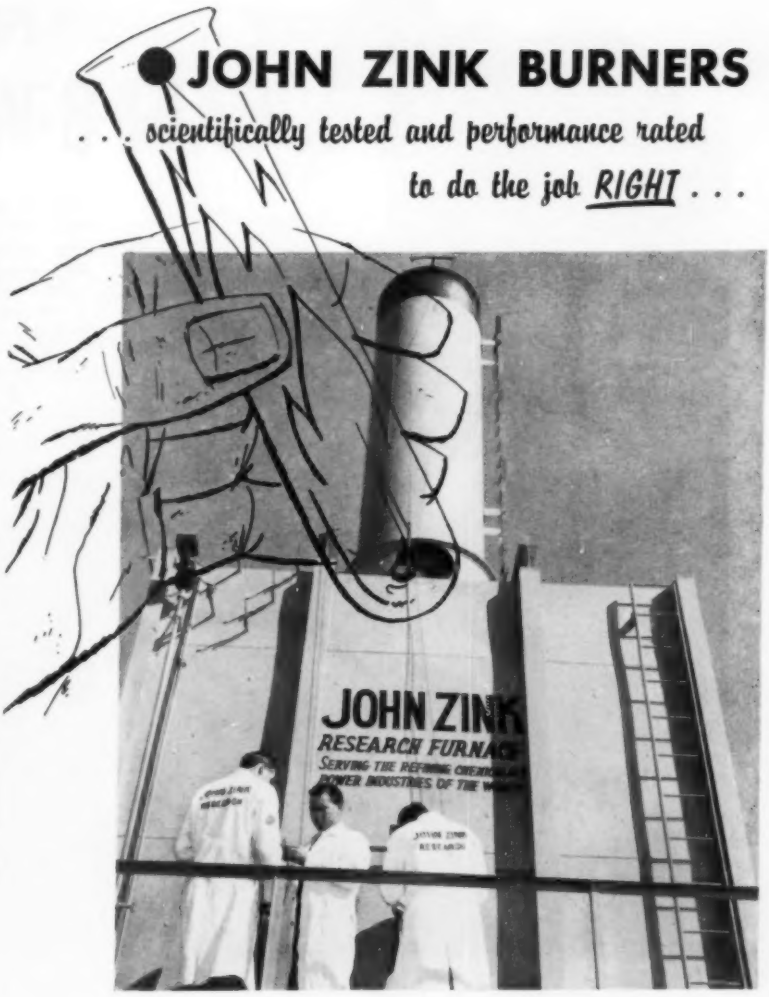

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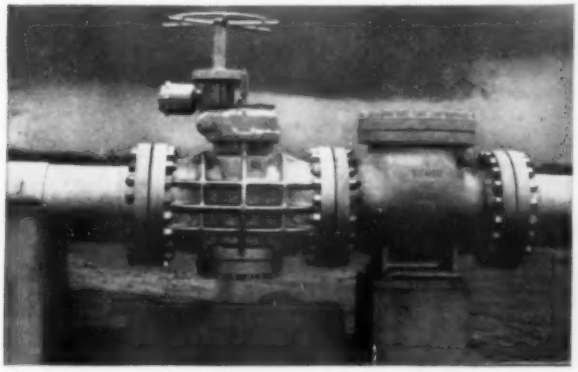
For full information on top-quality, cost-saving Republic SRK Plastic Pipe, contact your local Republic office or mail coupon.



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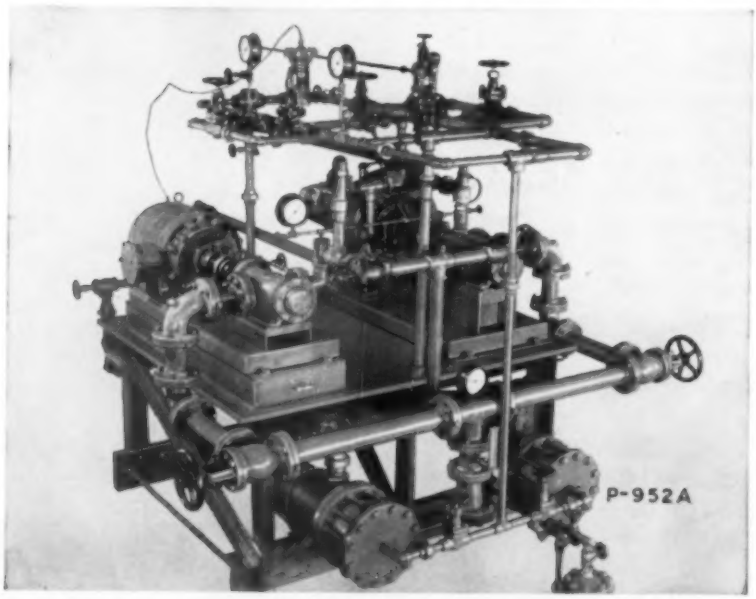

P-952A—Steam Turbine and Electric Motor drive gives flexibility in this compact P-ES2H size No. 25 unit.

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ciation, Petroleum Electric Supply Association, annual joint meeting, Adolphus Hotel, Dallas.

MAY

5-6 Society of Petroleum Engineers of AIME, North Texas section, secondary-recovery symposium, Wichita Falls, Tex.

5-7 Purdue University, thirteenth annual industrial waste conference, Purdue Memorial Union Building, Lafayette, Ind.

5-9 American Gas Association, distribution, production, and transmission conference, Roosevelt and Commodore Hotels, New York.

7-9 American Petroleum Institute, Division of Production, eastern district meeting, Deshler-Hilton Hotel, Columbus, Ohio.

8-9 Texas Petroleum Research Committee, eleventh oil recovery conference, symposium on "A Century of Texas Oil, 1875-1975," University of Texas, Austin.

11-14 Texas Independent Producers and Royalty Owners Association, annual membership meeting, San Antonio, Tex.

12-14 Chemical Institute of Canada, National Research Council, eighth Canadian high polymer forum, Macdonald College, St. Anne de Bellevue, Quebec.

12-14 Instrument Society of America, symposium of analysis instrumentation division, Shamrock Hilton Hotel, Houston.

12-15 American Petroleum Institute, Division of Refining, midyear meeting, Statler Hotel, Los Angeles.

20-22 Pennsylvania Gas Association, annual meeting, Pocono Manor Inn, Pocono Manor, Pa.

21-22 Western Petroleum Refiners Association, Southwest regional technical-industrial relations meeting, Hotel Paso del Norte, El Paso, Tex.

21-23 Rocky Mountain Oil and Gas Association, thirteenth annual convention, Cosmopolitan Hotel, Denver.

21-23 American Petroleum Institute, Division of Marketing, midyear meeting, Roosevelt Hotel, New Orleans.

22-23 American Petroleum Institute, Division of Production, Pacific Coast district meeting, Biltmore Hotel, Los Angeles.

26-28 Chemical Institute of Canada, annual conference and exhibition, Royal York Hotel, Toronto.

27-29 Annual Short Course in Gas Technology, Texas College of Arts and Industries, Kingsville, Tex.

JUNE

2-4 Petroleum Electric Power Association annual meeting Texas Hotel, Fort Worth.

5-7 National Oil Scouts and Landmen's Association, annual meeting, Mayo Hotel, Tulsa.

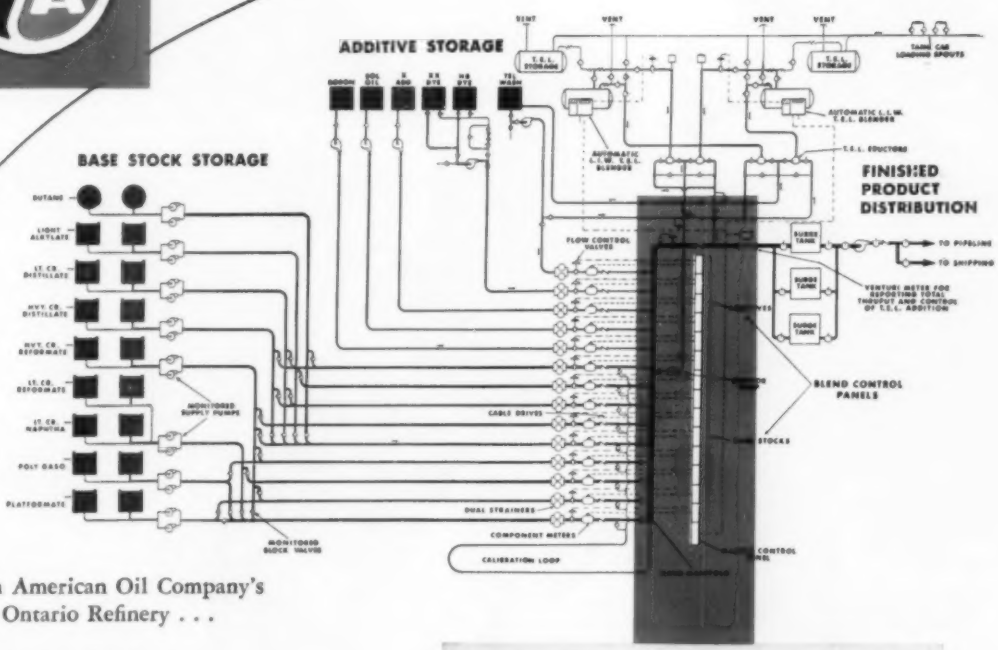
8-11 American Petroleum Institute, Division of Transportation, annual tanker conference, Greenbrier Hotel, White Sulphur Springs, W. Va.

10-12 Appalachian Underground Corrosion Short Course, School of Mines, West Virginia University, Morgantown, W. Va.

19 Pennsylvania Grade Crude Oil Association, annual meeting, Penhills Club, Bradford, Pa.

22-28 American Society for Testing Materials, annual meeting and exhibit, Hotel Statler, Boston.

POSITIVE CONTROL OF MATERIALS IN MOTION



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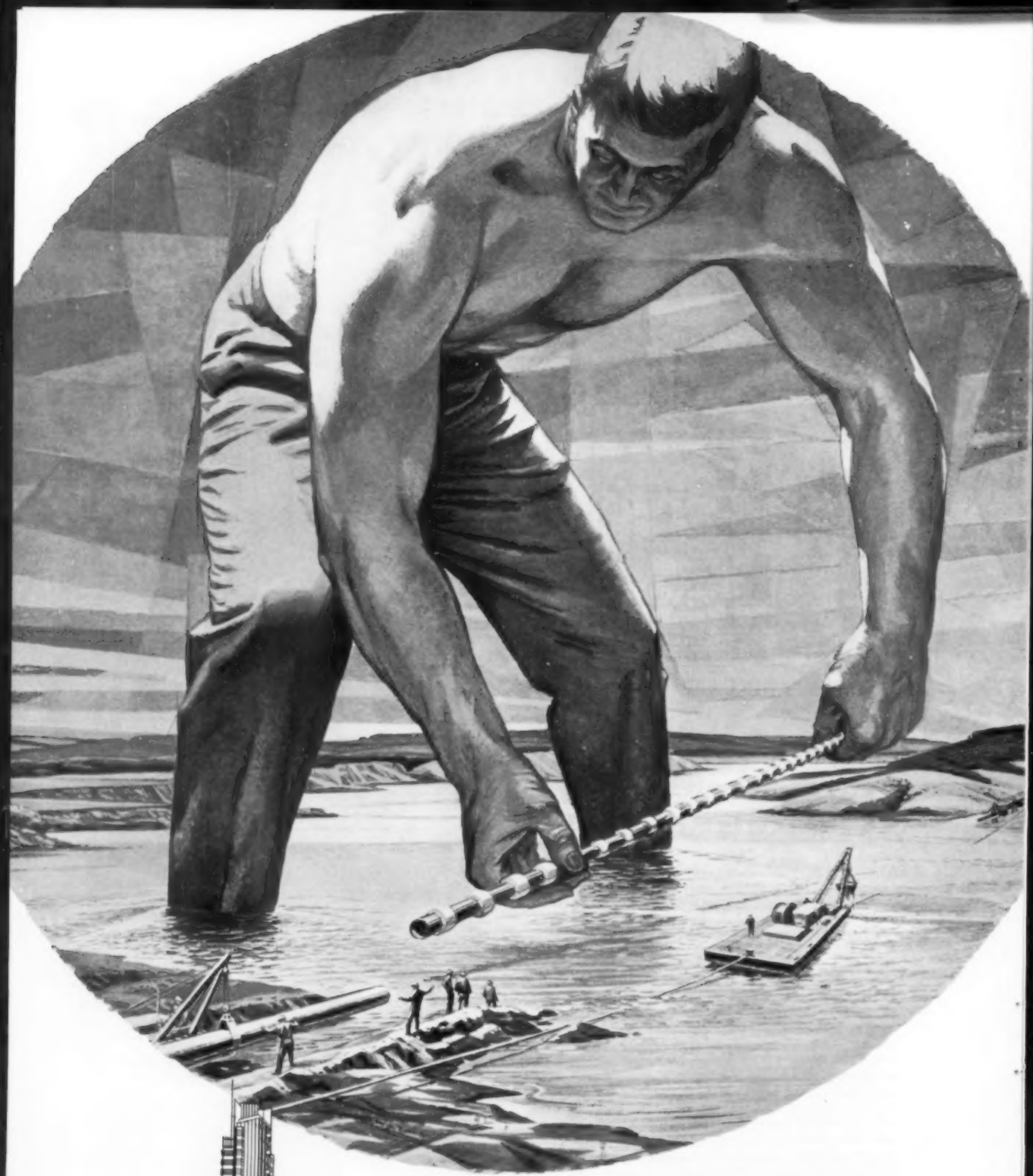

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the OIL AND GAS JOURNAL

TULSA, OKLAHOMA

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JOURNALLY SPEAKING

Top Twenty

ON THE CHANCE that you might get on a TV quiz show and be asked the question, you might want to memorize the following table. It shows the top 20 refiners in the United States, with the total barrels of crude they can put through their plants on an average calendar day.

Jersey	932,000
Indiana	715,000
Socony Mobil	656,000
Texaco	616,000
Shell	584,000
California	547,000
Gulf	544,000
Sinclair	453,000
Cities Service	286,000
Phillips	259,000
Sun	255,000
Tidewater	228,000
Atlantic	210,000
Union	189,000
Pure	182,000
Ashland	151,000
Conoco	149,000
Sohio	139,000
Richfield	139,000
Sunray	117,000

This tabulation was a sort of an afterthought of George Weber's after he got through checking the Journal's annual survey of refineries which appears on page 159 of this issue and writing the penetrating analysis of refinery construction and processing trends which appears in the news section.

George did work into his story a breakdown of how the majors and independents stand in refining capacity and equipment, and you'll be interested in studying this on page 89.

It isn't like George to overlook a story angle like the top 20 refiners, for he's been pounding out copy for the Big Yellow Book for more than 20 years. He wasn't always refining editor, though. He's an Upstate New York boy who hitchhiked to Oklahoma during the depression and worked his way through college. When he got his petroleum-engineering degree the depression was even worse and he had the choice of selling apples on a street corner or being a cub on the Journal staff.

He wasn't a refinery expert then. He was just a lowly field reporter, batting out columns and columns about wells drilled and formation tops logged. After several years of this, plus several more shooting cannons at unfortunate Japs and Germans, his big chance came. He was made refining editor and moved to New York among the big shots.

Today, as everybody knows, George Weber is the nation's top interpreter of what's going on in refining. Just read his analysis starting on page 88, and you'll agree.

Crude Picture

YOU KNOW what crude oil looks like, sure, but did you ever know what crude oil looks like to a refiner?

Look on pages 109 to 156 and you'll see "pictures" of 47 varieties of crude as seen through the eyes of a refiner. Very enlightening. Suppose, for instance, that you're interested in West Texas. Take a look at the picture of West Texas sour crude on page 110 and then the picture of Spraberry crude on page 116. It's hard to see any family resemblance in the portraits.

This rogues' gallery explains why some crudes are higher on refiners' "most wanted" list than certain others these days.

Of course there's nothing new about crude analysis. Refiners have been drawing pictures like this for years. And these pictures don't tell the whole story, either. An individual refiner must fit each picture into the kind of equipment he has and the variety of products he can market best.

And that's why refiners have so much trouble explaining to producers that they will pay a little more for this kind of crude and a little less —or nothing at all—for that kind. Oh for the good old days, say back about 1880, when crude was crude and nobody bothered about such details as end points and octane numbers.

—Henry D. Ralph.

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Warren's Resources of Production
Transportation and Storage
plus Warren's Experience as a
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When oil will get "back to normal"

WHEN will the oil business get back to normal? The best way to answer that question is to ask another: What is "normal" in the oil business?

Throughout its history, the oil business has been pretty much feast or famine. It has alternated between periods when it seemed it couldn't get enough equipment and facilities and couldn't produce and process oil fast enough, and periods when it seemed nobody wanted any of anything.

So in a sense today's condition is not abnormal—or certainly not unusual. It is the normal aftermath of conditions of a year and 2 years ago and could have been foreseen. But patience and foresight are not the most conspicuous of the oil industry's many admirable qualities.

BUT WHETHER OR NOT today's condition is accepted as normal, it will have to be accepted as a fact for quite some time.

The first sign that things are beginning to get better will be in the figures on stocks. When stocks of refined products, particularly east of the Rockies, get down below what they were at the same time last year, and when crude stocks get below 270,000,000 bbl., it will be the time to look for an upturn.

Domestic demand is roughly the same as last year and products stocks were too high last year. So part of current supply must come from inventory reduction rather than from new production. Stocks will have to fall below what used to be considered normal before the industry will begin to "feel normal" about things.

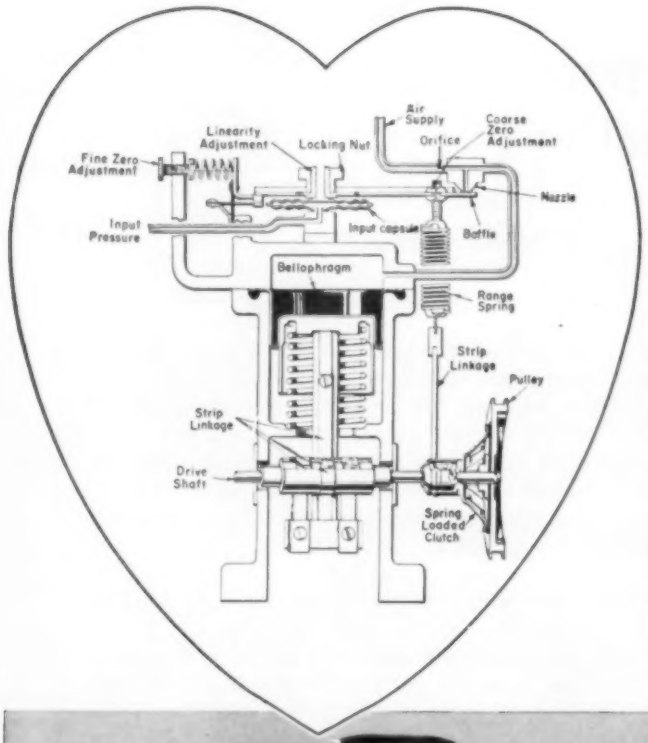
Here's where psychology enters to supplement statistics as a factor in business conditions. Neither Cassandras with prophecies of doom nor Pollyannas with glimpses of silver linings can influence actual consumption one barrel. But how oil men "feel" does influence what they do about meeting whatever the demand may be at the moment.

WHEN STOCKS of crude and products get down below what would "normally" be not excessive for the current rate of consumption, everybody will feel better. Then refiners will have to buy and run a little more crude to fill their day-to-day requirements. Then prices will begin to firm up a little bit.

Then allowables will rise some, and some additional wells will have to be drilled, and the industry will be back on a proper relationship to its market —and a really substantial market it is.

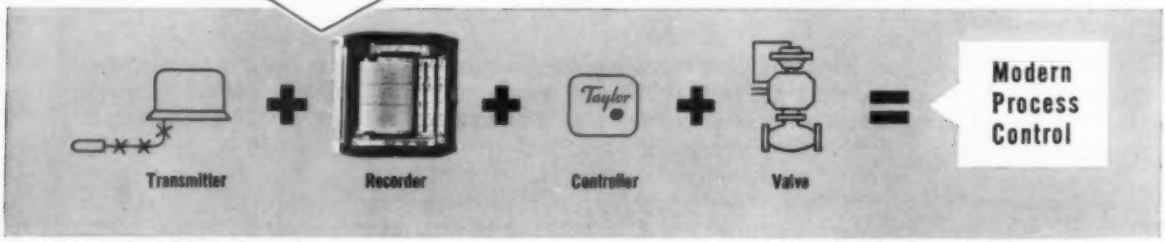
This won't be the same pell-mell rate of expansion that was "normal" for the industry a few years ago. But the industry had better get used to thinking of something less than that as "normal" for a good many months to come.

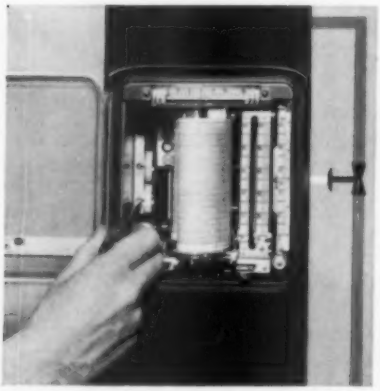
New Taylor TRANSCOPE*



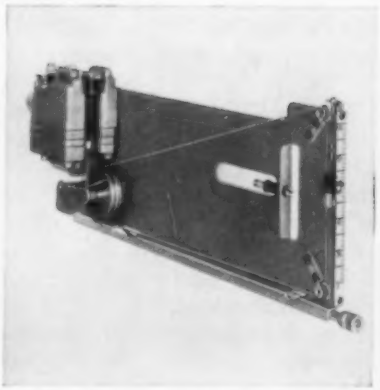
"SERVOMATIC" MOTOR assures lifetime accuracy of pen position. Transmitter signal is received and amplified by individual force balance servo-mechanisms. Efficient spring feedback and powerful longstroke pneumatic motor give *150 times greater power than normally available for pen positioning.* This means greater accuracy; less service needed. If you like servo-operated devices . . . power steering, power brakes . . . you'll want SERVOMATIC powered pens.

0.1% THRESHOLD SENSITIVITY—A NEW STANDARD OF ACCURACY. Responsiveness to transmitter output is 0.1%; and because of the very small pneumatic displacement of the input capsule, the response is practically instantaneous. You see more minute process changes, enabling you to make optimum control settings to increase yield of specification product. All servos are identical and interchangeable. Servo-pen connection is by means of cable . . . no long, jointed, flimsy links or levers. Allows perfect linear conversion from rotary motion . . . repeatability is truly amazing.

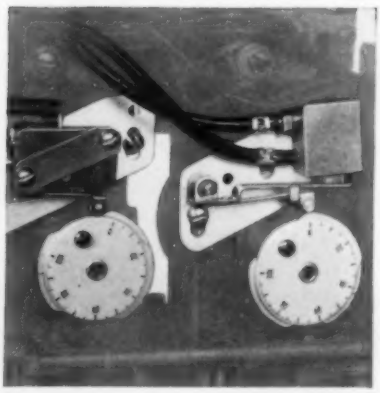




Controller Settings are made from the front while recording. Gain, reset and PRE-ACT® dials are calibrated in specific units. Eliminates blind adjustments; settings and results are seen in one-spot . . . the front of the panel.



Exclusive "Set Point Transmitter" allows continuous automatic control during recorder removal. Plug-in transmitter assembly may be removed and control valve sealed in operating position. Perfect for continuous processes.



Optional Alarms. Each SERVOMATIC motor can operate either an electric or a pneumatic alarm. Each alarm can be adjusted for one high and one low, or two high, or two low operating points. Microswitch on left, air valve on right.

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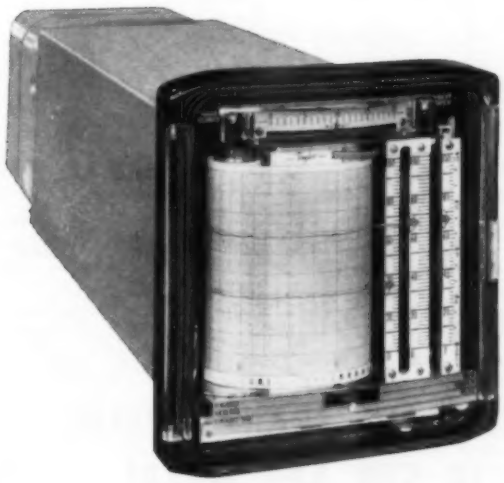

"No other recorder, regardless of size, puts so many features in so little panel space."

Front of Panel Control Settings let you make adjustments easier, quicker, and better . . . *from the front of the panel* . . . while recording! You can clearly see what you are doing, and the results, because the record is continuous.

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Complete Indicating Control Station while recorder is removed. You see the variable. There's no need to shut down the process for instrument service or adjustments. Horizontal gage at top of recorder will show either process variable or air output to valve, as desired.

Receives Three Variables to be recorded or indicated; has a Set Point Transmitter, an Automatic-to-Manual switching lever, a Cascade or process-output indicator, and many other features . . . all in a compact case.

For further information about this revolutionary new recorder, see your Taylor Field Engineer, or write for **Form No. 98282.** Taylor Instrument Companies, Rochester 1, N. Y., or Toronto, Ontario.

*Trade-Mark

MADE FOR EACH OTHER!

The Taylor TRANSCOPE Controller and Recorder are companion instruments. Together they give you new standards of process control performance . . unprecedented accuracy and adaptability. Ideal for the time constants of modern processing, exceptionally fast and responsive to adjustments, the TRANSCOPE Controller is also highly adaptable and simple to maintain. Write for **Bulletin 98278.**

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You are looking at dramatic proof that the new B-228 Process developed for the covers of BOSTON Oil Suction and Discharge Hose more than doubles resistance to sun, abrasion and tearing! Each of these two swatches of O.S. & D. Hose covers has aged for exactly the same length of time. The upper swatch from the BOSTON cover is as good as new. The lower swatch from the ordinary cover is cracked, torn, and deteriorated.

This is news. This is important. Now BOSTON'S new B-228 Process provides entirely new protection against 90% of O.S.&D. Hose failures. Without question, BOSTON O.S. & D. Hose can sharply cut your hose replacement cost. Specify BOSTON next time you buy!

228% GREATER RESISTANCE TO SUN DAMAGE

212% GREATER RESISTANCE TO ABRASION

207% GREATER RESISTANCE TO TEARING

*Unretouched Photograph

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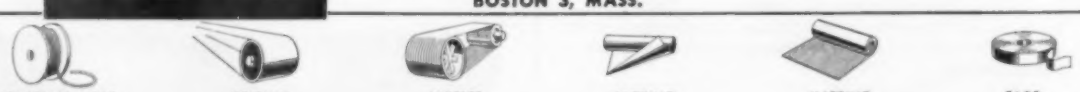


The OIL AND GAS JOURNAL

March 24, 1958

Bright Spots Appear In Supply Picture

Crude Output: Down 600,000 bbl. daily since January.

Refinery Runs: Cut 209,000 bbl. daily since January.

Product Stocks: Off 37,100,000 bbl.

THIS MEANS the oil industry is making some headway toward restoring a better balance between its supply and demand.

The results are not overly dramatic. But the lowered levels of production and refining plus stronger late winter demand in distillate, residual, and LPG are having a beneficial effect.

Oil men still face more of the same curtailments through the spring, however. Officials of prorated states and most refiners already have accepted this fact.

Indication also came during the week that the administration in Washington may scale down the volume of imports to relieve the pressure on domestic oil.

Thus with some luck in spring weather that will allow farm activity and motoring to pick up, refiners should be able to whittle down their heavy stocks of gasoline.

If the industry by these moves can get its house in order by late spring or early summer, oil men will be in a better position to take advantage of any business upturn in the last half of the year or ride out the storm if the present recession continues.

1. The cutbacks

Domestic production slipped to 6,270,000 bbl. daily last week.

That was a drop of 1,218,000 bbl. daily from the week before but 615,000 bbl. from the January average of 6,885,000 bbl. daily.

Indications came from several prorated states that they would continue the low allowables for April. These included:

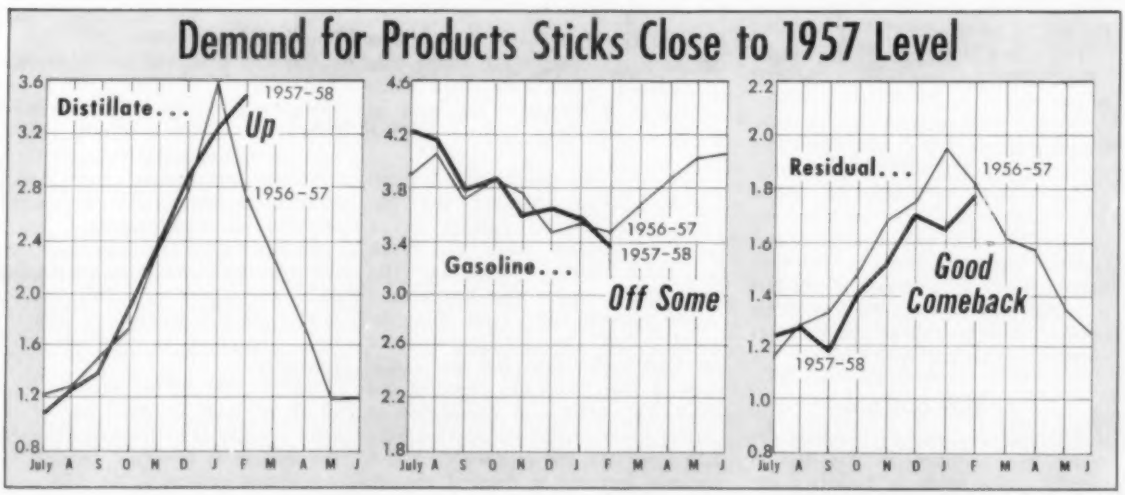
... **Texas**—cut April allowable again to 8 producing days, an all-time low.

Thus April production initially is estimated at 2,444,571 bbl. daily, a cut of 120,203 bbl. daily from the 2,564,774-bbl. allowable in effect March 15.

The unprecedented action of the Texas Railroad Commission had the strong backing of independent producers and major buyers as well. Purchasers reported that an 8-day producing schedule would have the healthy effect of forcing refiners to draw heavily on their storage and in many cases send them into the spot market to buy crude.

... **New Mexico**—cut top unit allowable for wells in southeastern fields from 34 to 33 bbl. daily, but increased top limit for wells in the northwest from 10 to 35 bbl. daily. The increase was based on anticipated opening of the Four Corners-to-Los Angeles crude pipeline in April.

... **Louisiana**—kept per well oil allowables for April at the same level as March since current production is



Stocks are still up from previous years

(Thousands of barrels)

	March 16, 1956	March 15, 1957	March 14, 1958	Change from March 15, 1957	
Crude*	255,993	251,993	286,085	+34,092	Have been high since last June.
Gasoline	195,941	205,589	216,525	+10,936	Increases in all major areas.
Kerosine	17,959	19,701	17,459	— 2,242	Most of drop in Gulf-East Coast.
Distillate	67,386	79,599	81,853	+ 2,254	District 2 down 2,401,000 bbl.
Residual	35,038	36,283	55,061	+18,778	Most of gain in California.

*Crude stocks for 1 week earlier.

running below nominations for March.

Refinery runs . . . Refiners, meanwhile, didn't make so spectacular a showing last week as producers in cutting back.

Refinery runs for the week ending March 14 totaled 7,479,000 bbl. daily. That's a 209,000-bbl.-daily decline from the January average and about even with the February level.

The full effect of refining cutbacks, however, still hasn't been felt. Many processors soon will start shutting units down for repairs and turnarounds. This will further reduce runs.

Product stocks? . . . Total of four-product stocks slid to 370.9 million barrels last week, a drop of 37.1 million barrels from their position at the end of January.

LPG actually has made more sensational reductions than the other petroleum products. Total stocks of LPG underwent their greatest 5-month reduction in light-products history during the recent cold weather.

The LPG total dropped to 368.7 million gallons at the end of February. This represents a decrease of 316.8 million gallons since the end of December and 647.7 million gallons since seasonal withdrawals started at the end of September.

The effect is to place LPG stocks 121,250,000 gal. less than at the end of last year.

Of the four-product stocks only kerosine is lower than last year. The reduction is 2,242,000 bbl. (see table).

But analysis of where the excess stocks are stored turns up some interesting facts. Stocks of distillate and residual both are higher than last year despite heavy withdrawals in the last 6 weeks. In both cases the high stock position is explained by unusual accumulations on the West Coast.

Stock changes by districts

(Changes from mid-March 1957, thousands of barrels)

	Gasoline	Kerosine	Distillate	Residual
East Coast	3,025	— 723	1,622	2,337
Appalachian 1	22	46	— 388	186
Appalachian 2	—185	— 37	— 116	120
Ill., Ind., Ky.	3,555	— 113	—1,162	— 402
Minn., Wis., Dak.	106	173	15	132
Okla., Kans., Mo.	— 42	— 58	—1,138	120
Inland Texas	945	— 19	5	316
Texas Gulf	2,165	—1,002	— 692	—1,214
Louisiana Gulf	—451	— 313	— 251	— 415
N. La.-Ark.	84	— 387	— 213	— 43
New Mexico	— 78	8	34	30
Other Rocky Mtn.	252	76	293	— 192
West Coast	1,538	107	4,245	17,803
Total U. S.	**10,936**	**—2,242**	**2,254**	**18,778**

2. The outlook

Although the over-all products demand has slumped in the last 6 months, gains made in February are keeping slightly more than 2 per cent above this time last year.

A big jump in middle distillate and kerosine demand accounts for much of the gain, since gasoline and residual demands both sagged.

The low demand for residual has been a drag for several months. Its demand has ranged lower this winter than for the last 2 years. Most of the drop has been due to the over-all decline in industrial production. Some marketers believe that price also has been a factor. Most of the cuts in residual prices have been since December following a big gain in stocks in the third quarter of last year.

The same cold weather that boosted middle distillate demand and improved the residual outlook put a crimp in gasoline sales. The result is a stock buildup at this time 10,936,000 bbl. higher than last year.

The outlook still is for total demand to continue at a level about 2 per cent higher than last year. Officials of The Texas Co. reported last week they believe it reasonable to expect domestic demand to rise from 2 to 3 per cent this year with a 5 to 6 per cent increase in demand abroad.

"All in all," the Texaco prediction stated, "we expect 1958 to be another good year."

3. Soft spots

The cutbacks have not removed all the pressure upon prices.

Product prices last week actually were weaker than economists could justify on the basis of markets and stocks. The same jitters appeared in crude prices in Oklahoma, South Louisiana, and California.

Gasoline at the refinery in Group 3 area was off one-fourth of a cent. Tank-wagon prices were expected to follow. A similar weakness was apparent for gasoline on the Gulf Coast. This was due largely to the serious bind being experienced by refiners who depend on spot sales.

In both areas distillates also came down earlier in the week on the basis of an East Coast cut. This was considered strange because of what has been happening to products stocks generally.

The 37,100,000-bbl. drop in stocks of all products since the end of January actually is considered a substantial decline in 6 weeks' time. It was due almost entirely to the cold weath-

er which put a heavy drain on distillates and residual fuels.

The price skittishness was attributed to a desire on refiners' part to pull down stocks as far as possible before the heating season ends.

A similar nervousness was touched off on crude prices. Interest centered on what would happen to the price of Oklahoma sweet, after Kerr-McGee Oil Industries, Inc., cut the price 15 cents a barrel to a new $3 top. This cut involved 48,000 bbl. daily in northeastern Oklahoma where Kerr-McGee earlier had assessed a 15 cents a barrel gathering charge (OGJ, Feb. 24, p. 82).

Kerr-McGee abandoned the gathering charge and substituted the price cut for the area. The charge had aroused Oklahoma independent producers, and Kerr-McGee explained its switch by announcing:

"This deduction has created operating, royalty, and tax problems for some producers, a number of whom have suggested that we substitute a reduction in the posted market price in this area for the 15-cent deduction."

Kerr-McGee said it regretted the change. The deduction was designed only for an area where gathering costs are high and didn't involve the general posted market price.

The Kerr-McGee cut was quickly followed by a similar one by Midland Cooperative, Inc., a small refiner at Cushing, Okla. The Midland cut involved only 5,000 bbl. daily the cooperative buys from leases in four Central Oklahoma counties.

Champlin Oil & Refining a few days later joined with a 15-cent cut on 20,000 bbl. daily it buys in eight counties for its Enid refinery. Champlin said the cut was needed to meet competitive conditions arising from steady declines in petroleum product prices in its marketing area.

The three cuts put about 16 per cent of Oklahoma sweet under a lower top posting and caused concern for general crude prices both in Oklahoma and West Texas, and Kansas.

The other instances of pressure to lower prices were widely separated. Century Oil Co., small Long Beach, Calif., refiner, cut its crude price postings an average of 55 cents a barrel in eight southern California fields.

Ingram Oil & Refining Co. announced in New Orleans it would not renew its present domestic crude purchase contracts when they expire unless the price is based more closely to value of refined products. Ingram last month cut its price for spot crude by 40 cents a barrel.

P. C. Spencer . . . . . . new board chairman.

E. L. Steiniger . . . . . . steps up to president.

M. L. Gosney . . . . . . retires as chairman.

Sinclair Shifts Top Management

SINCLAIR OIL CORP. has promoted its top command. P. C. Spencer, president since 1949, last week was elected chairman of the board and chairman of the executive committee. He will continue as chief executive officer.

E. L. Steiniger, formerly executive vice president of operations, has moved up to president to succeed Spencer.

Spencer succeeds M. L. Gosney, who is retiring as chairman of the board and chairman of the executive committee following 41 years' service with Sinclair.

Gosney became assistant treasurer in 1925, treasurer in 1940, vice president in 1941, and a director in 1942. He was elected executive vice president in 1949, and chairman of the board in May 1955.

Spencer joined Sinclair in 1934 in the legal department. He served in various capacities in the organization, and succeeded H. F. Sinclair, founder of the company, as president in 1949. Spencer served in 1954-55 as chairman of the API board of directors, and presently is the treasurer of API.

Steiniger joined Sinclair in 1925. He was elected vice president of the company in 1955 in charge of foreign operations, and was named executive vice president in charge of all operations in 1957.

Navajos Open, Reject Bids

THE NAVAJO Tribal Council last week opened bids totaling $5,810,399 for reservation oil leases in the Four Corners area and announced that it was rejecting bids totaling $949,402 opened in January and February.

J. Maurice McCabe, executive secretary of the Navajo tribe announced rejection of the bids on 26 tracts and said the tribe will "continue to reject any bid we feel is inadequate."

"As landowners, we have always had the right to refuse to lease our land, either before or after bids are asked," he said.

Most of the land involved in the rejected bids was in Arizona, where bonus offers of $641,272 had been made. The remainder was in Utah, with bonus offers totaling $308,130.

The prices offered on the 26 tracts were about average for those in recent sales. Tribal spokesmen indicated they had reason to believe that geology of the area is such that the tracts should have commanded considerably higher bonuses.

The tribe has retained Martin Bennett, Washington, D. C., geologist, to advise the council.

New bids . . . At last week's bid opening, the highest offer was made in a joint bid by Texas Pacific Coal & Oil Co., Pure Oil Co., and Lion Oil Co., a division of Monsanto Chemical Co. The bid was $1,054,412 or $411.88 per acre for a 2,500-acre tract 5 miles south of Mexican Water, Ariz.

John C. McPhee, administrative assistant to the council's chairman, said the council's advisory committee will probably meet in April to discuss the bids with Bennett, after which the bidders will be notified whether or not their offers will be accepted.

The Journal's

	Crude BPCD	Crude BPSD
Total Capacity 1-1-57	9,019,381	9,569,182
Total Capacity 1-1-58	9,130,436	9,703,925
New Construction 1958	224,890	251,300
Est. Capacity 1-1-59	9,355,326	9,955,225
New Construction 1959	164,400	175,700

About the survey . . .

FIGURES in this report are based on plant-by plant capacity data given to us by operating refiners. The detailed survey, which is the only one of its kind, begins on page 159.

This survey includes all facilities which were in operation at the first of this year and is restricted to plants charging whole crude oil. An appendix lists 13 specialty plants processing petroleum or related fractions to produce asphalt, lubes, wax, and fuels. These units are included in the report on these pages, explaining why some totals will not agree exactly with those in the summary table leading the basic survey.

It is recognized that a survey of refineries does not include all sources of gasoline. Numerous field processing plants produce blends or finished motor fuel, but are not included because they are not classed as refineries. They will be surveyed in our April 21 issue.

Except where designated, all figures in the Journal survey are expressed in barrels per stream day. In a few cases only calender day capacity is reported to us. Such figures are identified and published as reported in the basic survey. To arrive at consistent totals, calendar-day figures are converted to stream-day basis. They are divided by .95 in the case of crude and vacuum units and .90 in other processes.

The Journal does not attempt to pinpoint forecasts of capacity. But it does include a listing of all new construction planned at the first of the year. These net additions to capacity have proved reasonably accurate in projecting over a 1-year period. But they do not take into account the unscheduled shutdown, retirement, or downgrading of capacity which may occur during 1958.

Projected thermal-cracking capacity is considered to be high, but how much, no one knows at this time. The net increase from new construction will probably be more than offset by retirement of existing units. No attempt is made to estimate this corrective figure.

Domestic Refining

George Weber
Refining Editor

THE GROWTH in U. S. refining capacity is slowing down. In view of the top-heavy position of potential over demand, this is regarded as a favorable trend. Basic crude charging capacity stood at a record 9,130,000 bbl. per calendar day on January 1, and the excess over current requirements swelled to a new high.

Refiners haven't stopped building, however. They are continuing a fairly heavy investment in processing designed to upgrade product quality. New crude capacity is also being added. But much of it is offset by a rising retirement rate for older, less efficient facilities.

Here's the U. S. refining picture:

. . . **Crude capacity** rose only 1.2 per cent last year. In 1958, new capacity less announced shutdowns indicates a maximum gain of 2.5 per cent. It is conceded that this gain will be further shaved by the loss of more marginal capacity as the year progresses.

. . . **Hydrogen treating** showed a whopping 49 per cent increase in 1957. More new capacity to desulfurize and otherwise improve feed stocks and products will swell the national total to more than 1,600,000 bbl. by year's end.

. . . **Catalytic reforming** capacity moved upward another 23 per cent last year. A further boost of about 21 per cent is on the books for 1958. The widening base of catalytic reforming feed stocks is sustaining the growth of this important octane-producer, and it seems headed for a national level representing 20 per cent of total crude capacity.

. . . **Catalytic cracking** is showing signs of approaching saturation. But the ratio on crude capacity is still edging upward toward the 46 per cent level sometime in 1960.

. . . **Thermal cracking** continues to dwindle. Coking and visbreaking show some new interest, but older uses are going out at a faster rate. Over the extended future some refiners expect a renewed interest in thermal cracking to make gasoline for further processing in hydro, reforming, and other modern catalytic units.

Signs of the times . . . In forecasting crude capacity for the coming year, the Journal survey has normally been on the conservative side. During good demand periods, refiners added slightly more capacity than their new construction programs indicated. This was done by bottleneck removal and better planning.

This year it was different. The forecast to January 1, 1958, made 1 year ago, was 1 per cent over the actual figure as reflected in the current survey. Unscheduled scrapping of existing equipment in the face

Forecast of U. S. Refining

Thermal Cracking	Cat Cracking	Cat Reforming	Hydrogen Treating	Alkylation	Polymerization	Lubes	Coke
(Feed, BPSD)				(Product, BPSD)			(Tons/da)
2,330,310	3,988,565	1,247,657	878,955	272,619	143,611	191,906	14,392
2,208,715	4,246,165	1,533,090	1,342,725	310,365	148,873	196,013	14,658
12,900	256,350	326,600	298,100	51,430	4,900	1,000	300
2,221,615	4,502,515	1,845,690	1,640,825	361,795	153,773	197,013	14,958
64,100	134,320	36,489	36,943	7,889	1,702		1,219

Capacity Is Leveling Off

of disappointing demand made the difference.

During 1957 refiners operated their stills at about 87 per cent of calendar day capacity. The unused "cushion" rose to about 1,156,000 bbl. daily.

What about January 1, 1959? Some momentum remains in projects planned more than 1 year ago. But unless the profit picture improves, more plant shutdowns are going to occur during the year. This indicates that the 2.5 per cent indicated in the current survey will be an absolute maximum.

Cat recycle rate is up . . . U.S. refiners boosted total catalytic cracking capacity by 6.5 per cent during 1957. More of this total reactor-feed capacity was used for processing recycle streams. As of January 1, 1957, recycle capacity represented 24 per cent of total capacity, and nearly 32 per cent of fresh-feed capacity. This year the recycle level rose to 26.8 per cent of total, and 36.8 per cent of fresh feed. The estimates reported in new construction indicate that this level will rise further this year and next.

On the basis of total crude capacity in all U. S. refineries, catalytic cracking now stands at 43.8 per cent. But 435,000 b.p.s.d. of this crude capacity is in small skimming plants and specialty plants making asphalt and other products. The average cat-cracking capacity in plants designed to make a full line of distillate products of competitive quality is today about 45.7 per cent of crude. On the same basis, the level will rise to about 48 per cent into 1960.

How the Majors and Independents Stand

	Companies controlling over 100,000 bbl. capacity			Companies controlling less 100,000 bbl. capacity		
	1-1-57	1-1-58	*1-1-59	1-1-57	1-1-58	*1-1-59
	(Capacities in 1,000 bbls. daily)					
No. Cos.	20	20	20	161	156	156
No. Ref.†	122	120	120	195	191	191
Crude Cap. BPCD	7,287.2	7,339.5	7,523.0	1,732.2	1,790.9	1,832.3
Crude Cap. BPSD	7,739.3	7,803.3	7,995.6	1,829.8	1,900.6	1,959.6
% Change	+5.8	0.8	2.5	+1.1	+3.9	+3.1
% U. S. Total	80.9	80.4	80.3	19.1	19.6	19.7
Cat Cracking	3,379.5	3,553.4	3,769.9	609.1	692.6	732.6
% on Crude	43.6	46.2	47.1	33.3	36.5	37.4
Cat Reforming	1,027.1	1,232.2	1,532.5	220.0	300.9	327.2
% on Crude	13.3	16.0	19.2	11.9	15.8	16.7
Hydro. Treating	774.2	1,161.8	1,427.1	104.8	181.0	213.8
% on Crude	10.1	15.1	17.8	5.7	9.5	10.9
Alkylation	247.4	277.4	313.5	25.2	32.9	48.3
% on Crude	3.2	3.6	3.9	1.4	1.7	2.5
Polymerization	107.7	110.2	114.8	35.9	38.7	39.0
% on Crude	1.4	1.4	1.4	2.0	2.0	2.0

*Estimate based on new construction slated for 1958 completion only.
†Includes 12 independent and 1 major company plant not charging whole crude—see page 196.

Octane pressure remains . . . During the past year, premium grade Research octanes rose an average 1.2 numbers. Regular grade quality moved up .7 RON. This is a slowing of the octane race—numberwise. But

Hydrogen Treating . . . not saturated yet.

(FEED CAPACITY, BPSD)

Type	1-1-56	1-1-57	1-1-58	Est. early 1960
Unifining	205,000	364,405	498,605	609,848
Hydrofining (Ind.)	34,600	124,700	187,600	236,600
Hydrofining (Esso)	113,800	133,300	164,900	239,500
Gulfining	.....	50,000	100,000	100,000
Socony	.....	67,300	99,260	129,260
Sinclair	10,000	27,000	87,500	95,000
Shell	31,000	49,000	70,700	86,700
Kellogg	3,000	3,000	20,000	42,500
Texaco	11,100	16,650	16,700	28,900
Houdry	13,500	13,500	13,960	13,960
Misc.	11,000	29,500	83,500	95,500
Total	**433,000**	**878,955**	**1,342,725**	**1,677,768**

Coking . . .

. . . on the move again.

(FEED CAPACITY, 1,000 BSPD)

	Delayed	Batch	Fluid	Total
1-1-55	243.8	35.3	3.8	**282.9**
1-1-56	296.5	27.3	13.8	**337.6**
1-1-57	304.7	43.9	105.8	**454.4**
1-1-58	319.4	37.4	100.6	**457.4**
1-1-59*	344.4	37.4	100.6	**482.4**
Early 60	366.6	37.4	100.6	**504.6**

*Est.

Cat Reforming . . . nearing 2 million barrels.

(FEED CAPACITY, BPSD)

Type	1-1-55	1-1-56	1-1-57	1-1-58	Est. early 1960
Platforming	277,690	525,470	639,567	714,640	943,329
Ultraforming	24,750	103,150	158,370	201,590	249,590
Socony	9,000	9,000	87,300	119,600	119,600
Sinclair-Baker	19,000	37,000	84,000	93,700	120,700
Houdriforming	28,540	58,220	62 500	75,210	99,710
Fluid Houdriforming	61,450	61,450	62,000	62,000	62,000
Catforming	42,550	39,610	27,950	59,150	59,150
Isoplus	.....	.....	45,000	45,000	45,000
F. B. Hydroforming	67,300	42,870	32,870	33,000	19,000
Powerforming	.....	5,500	5,500	32,500	59,400
Rexforming	.....	.....	9,500	30,500	30,500
Thermofor C. R.	19,000	35,000	32,000	30,300	30,300
Misc.	20,050	9,200	1,100	35,900	43,900
Total	**569,330**	**926,470**	**1,247,657**	**1,533,090**	**1,882,179**

Isomerization . . .

. . . just getting under way.

Type	No. units	Product capacity BPSD*
Butane	3	9,300
Pentane	3	21,000
Hexane	1	3,800

*Units contracted or building.

Cat Cracking . . . is leveling out.

(FEED CAPACITY, BPSD)

Type	1-1-56	1-1-57	1-1-58	% recy.	Est. early 1960	% recy.
Fluid	2,694,312	2,975,785	3,150,615	26.1	3,536,285	27.2
T.C.C.	733,520	727,070	764,600	30.0	767,600	30.0
Houdriflow	203,800	215,980	249,800	25.1	251,800	25.1
Houdry F. B.	55,300	48,300	68,800	20.0	68,800	20.0
Cycloversion	22,400	21,430	12,350	....	12,350	....
Total	**3,709,332**	**3,988,565**	**4,246,165**	**26.8**	**4,636,835**	**27.6**

Alkylation . . .

. . . moving up steadily.

(PRODUCT CAPACITY, BPSD)

	Sulf.	HF	Total
1-1-55	186,614	49,614	**236,228**
1-1-56	197,869	65,540	**263,409**
1-1-57	212,659	59,960	**272,619**
1-1-58	244,615	65,750	**310,365**
% crude	2.5	0.7	**3.2**
Est. 1-1-59	276,515	85,280	**361,795**
% crude	2.8	0.8	**3.6**
Proj. 1960	283,155	86,529	**369,684**

the increasing difficulty in making ever higher quality maintains the pressure on refiners.

This is indicated in the continued growth of catalytic reforming, topping 1,500,000 b.p.s.d. in January. About 350,000 bbl. more is on the way this year and next.

Cat reformate can no longer carry the octane load alone. Motor alkylate is beginning to come into the motor-fuel picture more and more. An estimated 5 to 10 per cent of today's premium gasoline comprises alkylate. This need for clean-burning, high road octane paraffins is sustaining an alkylate-plant building program. Independents as well as majors are sharing in this new construction. Of further interest, the HF process is getting new attention this year, although it still lags sulfuric acid by a wide margin.

Isom is coming . . . As reforming severities rise, refiners are looking to another process to augment alkylation. Although isomerization of pentanes, hexanes, and heptanes offers no mass octane potential like that of cat reforming, it is beginning to emerge in commercial use. Three units for pentane and hexane isomerization will go on stream this year. All are located in refineries which have more than the normal supply of light hydro-

carbons. Widespread adoption is anticipated in 2 to 3 years.

Butane isomerization is also coming back. As alkylation grows, refiners will need to augment available isobutane, and more units are on the way.

More hydrogen in use . . . Hydrogen-treating capacity installed last year, plus that now under way, promises to double the level of a year ago. Reformer-feed treating accounts for roughly 66 per cent of all such capacity. Many companies follow the standard practice of packaging pretreat units on all reformer facilities.

Stiffer competition in middle-distillate quality prompted many refiners to add hydrogen treating last year. About 28 per cent of all hydrodesulfurization capacity is now used for this purpose, plus a growing volume of lubricating oil, waxes, and other products. The remaining capacity amounting to about 80,000 b.p.s.d. is used to pretreat feed stocks other than reforming naphthas. These include mainly fresh and recycle cat cracking stocks.

Independents gain slightly . . . In comparing the 20 largest refining companies with the 191 others in the industry, the smaller group is seen to be increasing its share of the nation's capacity by a small margin. The independents remain a vital group. Of 8 new refineries now planned, 7 representing 65 per cent of total new crude capacity are proposed by small refiners.

However, the majors still dominate the industry, with more than 80 per cent of total throughput. The majors maintain a lead in the level of their catalytic processing, but it is not a commanding lead. Some independents top all competition in their respective marketing areas. Their numbers are dwindling, however, due to continuing mergers.

Are Canadian Refiners Overbuilding?

THERE IS a decided switch in the Canadian refining picture this year. Since World War II the industry has been jumping to keep up with a swift-rising consumption of oil products.

This bright picture has attracted some newcomers to the Canadian scene, and the result may be an excess of refining capacity—at least in the eastern provinces.

The current survey of the industry shows that Canadian capacity rose nearly 10% last year. A nominal 5 to 6% addition is under way for 1958. But if plans follow through for new refineries coming on stream in 1959 and 1960, a 16% boost appears in order.

Meanwhile, Canadian refiners have been busy boosting product quality. Catalytic-reforming capacity more than doubled last year, and a three-fold increase was made in modern hydrogen-treating facilities. Catalytic cracking is maintained at about 44% of crude capacity, comparable with the U. S. level.

The newcomers . . . Since World War II, 11 new refineries have been built in Canada, and most of the remainder were expanded and modernized. Initially, this work was done by Canadian companies.

Then came the "invasion" of this rich new market by newcomers from the U. S. and from Europe. Sun Oil Co. of Canada built a modern plant at Sarnia. Canadian Petrofina, a subsidiary of Belgium's big Petrofina organization, moved into the Montreal area with another plant using the newest of catalytic processes. Petrofina is again boosting its capacity and competing for markets in Quebec.

Last year two more companies decided to enter Canada. Cities Service Oil Co., Ltd., has begun construction of a 20,000-bbl. per day refinery near Toronto. Last week, British Petroleum, Ltd., signed a contract for construction of its 25,000-bbl. refinery near Montreal.

Still another major refinery is coming to eastern Canada. Although Irving Oil Co. has made no official announcement, it is known to have contracted for building a 38,000-bbl. refinery near St. John, New Brunswick. This will be the second major plant for the Atlantic provinces. Imperial Oil, Ltd., recently replaced its Halifax, N. S., plant with a completely modern 50,000-bbl. refinery.

Other established Canadian companies have been active in adding capacity. British American Oil Co., Ltd., last year more than doubled its Clarkson, Ont., plant and will later this year complete a new 20,000-bbl. refinery near Vancouver, B. C. Later, probably in 1960 or 1961, Shell Oil Co. of Canada, Ltd., will build a 20,000-bbl. refinery near Toronto.

The future . . . This program of new grass-roots refineries, plus continued expansion and modernization of existing plants, will bring Canada over the 900,000-bbl. per calendar day mark by 1961.

Will the demand be there? Economists last year predicted a continuing 6 to 8% annual rise in petroleum consumption in the nation. This projection is considered sound in the long run. But for the next year or so Canada may not realize this rate of climb. Even if demand does continue to rise at that rate, the concentration of new refining capacity in Ontario, Quebec, and to the east spells possible trouble in too much expansion.

The Journal's Forecast of Canadian Refining

	Crude			Thermal	Cat	Cat	Hydro.	Alkyl-	Polymer-
	BPCD	BPSD	Vacuum	cracking	cracking	reforming	treating	ation	ization
1-1-57	691,650	747,250	256,260	139,325	337,200	61,505	19,025	2,250	22,707
1-1-58	758,230	823,240	296,920	119,345	360,940	126,625	58,775	2,230	30,807
Per cent over '57	9.6	10.1	15.8	—14.3	7.0	106.0	208.9	....	35.7
1958 constr.	44,300	48,500	22,735	3,000	30,300	19,100	29,200	2,500	.....
1-1-59*	802,530	871,740	319,655	122,345	391,240	145,725	87,975	4,730	30,807
Per cent over '58	5.8	5.9	7.7	2.5	8.4	15.1	49.5	112.0	.....
Constr. '59 and later*	129,200	135,500	49,000	.....	69,600	19,200	19,000	3,000	.....

*Estimated.

TGT Files New Plans

. . . with FPC for Midwestern line. Latest deal is designed to move gas to the Chicago-Gary area by next winter.

MIDWESTERN GAS Transmission Co. is seeking a Federal Power Commission permit to rush construction of a $45,000,000 pipeline which would make new supplies of natural gas available to the fuel-hungry Chicago-Gary area by next January 1.

Under applications filed last week, the company proposes to lay a 30-in. line between Portland, Tenn., and Joliet, Ill., to move 260,000,000 cu. ft. of gas per day.

The new move is in line with a recent agreement between Midwestern and Peoples Gas Light & Coke Co. (OGJ, March. 10, p. 90-91). Peoples, which had been the chief rival for the Chicago area markets, suddenly withdrew its opposition to Midwestern's entry into the area.

Midwestern's new proposal is an alternate to one segment of a more elaborate plan to serve Midwest markets with both Canadian and U. S. gas.

The earlier proposal, still pending before the FPC, called for a $111,000,000 pipeline between Portland and the Canadian boundary near Emerson, Man. Under the earlier application, the Portland-Joliet section of the line would have been only 24 in. rather than 30 in.

Its capacity likewise would have been smaller, approximately 200,000,000 cu. ft. daily as compared with 260,000,000 under the new application.

Tennessee Gas Transmission Co., Houston, parent firm of Midwestern, also filed applications in support of the new project. T.G.T. is seeking authority to install additional compressor horsepower on its main transmission system. This would permit the parent company to deliver up to 350,000,000 cu. ft. of gas per day to Midwestern at the Portland junction.

Early approval required . . . Reports indicated Illinois state officials and gas companies serving the Chicago-Gary area were joining forces to urge hasty approval of Midwestern's new application by the FPC.

Midwestern is hoping to get FPC approval by April 15 so the new facilities can be constructed as early as possible. If the authorization is not granted by April 15, the company stressed, the proposed service cannot be started by the 1958-59 winter.

"In that case," explained a company spokesman, "its alternate application will have no meaning and will be dropped."

The Midwestern application confirmed reports that it had reached an agreement with its competitors to end the controversy which had raged for 2½ years over the so-called "invasion" of the Chicago markets.

If the new plan is approved Midwestern will deliver large volumes of gas for residential markets in the Chicago area in addition to serving two nearby steel plants. Under its original plan, the Midwestern line would have bypassed Chicago's big residential market where an estimated 250,000 homes are awaiting gas service.

Proposed Midwestern sales . . . Midwestern proposes to reserve 15,000,000 cu. ft. daily of its capacity for resales. Remainder of the gas will be delivered as follows:

. . . Northern Indiana Public Service Co., 100,000,000 cu. ft. per day.

. . . Peoples Gas Light & Coke Co., 75,000,000.

. . . Northern Illinois Gas Co. 50,000,000.

. . . Illinois Power Co., 15,000,000.

. . . North Shore Gas Co., 5,000,000.

Deliveries would be made by Midwestern at connections near Joliet with the systems of Natural Gas Pipeline Co. of America and Chicago District Pipeline Co. These two companies, both subsidiaries of Peoples Gas, would in turn deliver the gas to the four distribution systems through existing connections.

Pipeline truce . . . In the past Peoples Gas had refused to purchase gas from Midwestern, which was accused of trying to "invade" an established market. Opposition to entry of competitors into the Midwest has been under investigation by a federal grand jury in Wisconsin.

After the truce between Midwestern and Peoples, the Justice Department refused to clear the new agreement from possible antitrust action in the future (OGJ, Mar. 7, p. 93). However, this was interpreted as a standard procedure by the Justice Department and was not considered cause for delay of the project.

In return for withdrawing its opposition to the new line, Peoples received assurance that Midwestern would not oppose eventual construction of the "Beatrice" project. This project, which would include expansion of Natural Gas Pipeline's system from Texas through the Beatrice, Neb., area, was postponed because of the Memphis decision.

Midwestern emphasized that its new proposal for immediate construction of its system to the Chicago area does not alter its long-range plan to extend the line all the way to the Canadian border.

Northern Natural Eyes Illinois

NORTHERN NATURAL Gas Co. has moved to serve a portion of the Illinois market which is now the province of Peoples Gas Light & Coke Co., Inc., Chicago.

Northern Natural filed an application with the Federal Power Commission to sell 50,000 M.c.f. daily to Northern Illinois Gas Co., starting this fall. Northern Illinois will seek similar approval from the Illinois Commerce Commission.

Northern Natural also announced it is preparing a revised application to push its $86-million 1958 program which was rejected a month ago. This application proposes service to an additional 177 communities in Minnesota, Wisconsin, North and South Dakota, Iowa, and Nebraska.

Northern Illinois is now served by pipeline subsidiaries of Peoples. The company said the contract with Northern Natural had no bearing on an agreement to purchase a similar volume from another potential new supplier, Midwestern Gas Transmission Co. (see above). The firm year-round sale will benefit Northern Natural by improving its load factor.

Proposed construction . . . Northern Natural will spend $2,226,000 to extend its system at Dubuque, Iowa, across the Mississippi River into Illinois, and $5,597,000 for additional capacity south of Ogden, Iowa, to handle the increased volume.

Northern Illinois plans a $15-million line from the river crossing 140 miles to connect with its system at Des Plaines, Ill. The company expects the new supply to permit connection of one-third to one-half of the

115,000 house-heating customers now on waiting lists.

If favorable action is obtained from FPC this summer, the proposed projects could be completed in time for the winter heating season. This timetable could be upset by intervenors who might prolong the hearing.

Northern Illinois said its supply from Midwestern may be available this year, but noted there are many uncertainties concerning the project at this time. The company expects substantial additional supplies from Peoples next year through an expansion postponed by the Memphis decision and resulting financial problems.

Colorado Tax Hit

again as Pan American files protest in Denver court.

PAN AMERICAN Petroleum Corp., undaunted by a February court decision against The California Co., is attacking Colorado's oil and gas severance tax anew in a suit on file in Denver District Court.

Denver District Judge Edward J. Keating, ruling in the Calco case February 15, held the state's gross income tax on all income from oil and gas production in Colorado is proper and valid (OGJ, Feb. 24, p. 92).

Pan American's complaint against the state asks a refund of $268,573 in taxes paid "under duress" on the company's 1955 Colorado income of $8,900,000. Pan Am's attack on the severance tax is similar to Calco's, principally that the levy is discriminatory and violates several sections of both the Colorado and United States constitutions.

Calco attorneys have not yet decided on whether to appeal the District Court ruling to the Colorado Supreme Court. The firm has 2 more months to make up is mind.

Pan Am's suit was the fifth challenging the severance tax. Calco filed the first case July 6, 1955, and this is the one it lost in District Court last month. It subsequently filed a second suit, seeking a refund of later taxes paid, and this is still pending. Sinclair Oil & Gas Co. filed a refund suit in October 1956 as did Stanolind Oil & Gas Co., predecessor to Pan American Petroleum Corp.

Action in District Court has been held in abeyance on the pending suits until final disposition of Calco's test action.

The Calco decision involved about $15 million already paid by oil producers in Colorado since the tax was enacted in 1953.

watching WASHINGTON

. . . with Bertram F. Linz

• Barge operators face triple threat

WATER CARRIERS of oil and other bulk traffic are fighting a two-pronged attack sparked on one side by the railroads and on the other by the Government.

The railroads, badly hurt by falling volume, are asking Congress for two privileges. One would permit them to set freight rates without going to the Interstate Commerce Commission. The other would let them engage in any form of transportation, including water.

The Government, looking for revenue, is thinking of putting tolls on the inland waterways. The railroads, of course, are all for it.

All three ideas are branded by the barge operators as reactionary. They would throw transportation back to the days of the "robber barons," setting off ruthless rate wars and dog-eat-dog competition.

The water carriers have no illusions about what would happen. They see themselves frozen out by the railroads, which could make up losses in areas of water competition by excessive rates in other areas.

Even tolls would hurt water traffic, raising rates to a point where the pipelines could make a bid for the business, the water men say. The margin between barge and pipeline costs is so narrow that the greater part of the oil tonnage would be driven off the waterways.

• Pipelines feel revenue pinch

TRAFFIC AND REVENUES of crude oil and product pipelines were hit sharply in the last half of 1957.

As a result, 26 of the 69 large lines reporting to the Interstate Commerce Commission showed less traffic in 1957 than in the preceding year. And 31 companies—nearly half of the total—showed revenue losses ranging from 1.6 to 27.4%.

There was a slight increase in traffic over 1956. But it was less than 60 million barrels, which brought total volume to 4,448 million barrels. The gain in 1956 over 1955 was 411 million barrels.

Revenues, totaling $670.6 million for the year were more than $9 million under the 1956 figure. There was a gain of nearly $59 million in 1956 over 1955, an ICC analysis shows.

• Oil to expand, but at a slower rate

OIL MEN are less pessimistic about the future than are industrialists in other lines.

This is disclosed in the latest government report on planned plant expansion this year.

Business and industry as a whole will spend 13% less than the nearly $37 billion put into new plant last year.

But refiners will cut back only 10% from the $3,453 million they laid on the line in 1957.

The drop in expansion of oil and gas pipelines will be much sharper. The gas lines, particularly, are scrapping building plans because of the Memphis decision.

Any antirecession moves by the administration will have little immediate effect on this situation. Only a reversal of the Memphis decision could bring about the building of new gas lines, for instance. Only a reversal of the rise in joblessness is likely to spur any great refinery expansion.

At the same time, the more than $3 billion which refiners still expect to put into new plant will be important in the $32 billion which the Government now figures will be spent on expansions this year.

Will Proration Damage Water Floods?

- Oklahoma's across-the-board cut in production will shed some new light on this question. Even flood operators don't agree that damage will occur.
- Exceptions are being allowed operators who can show reasons for fearing a loss in ultimate production, but there's still dissatisfaction among many.

THE OIL INDUSTRY in the weeks to come will get new information on an old controversy—whether cutting back water-flood production will cause the loss of some reservoir oil forever.

The Oklahoma Corporation Commission, forced to cut sharply the state's crude output, met the problem by putting a partial clamp on water floods along with the better-producing wells in the state.

To ease the pain, the commission granted a large number of exceptions to operators whose projects currently are building up pressure and increasing production. Most engineers believe it is this type of water flood that should not be disturbed by a cutback.

Perhaps the biggest significance in the commission's action was that it decided for the first time in history to force all producers to share proportionately in a production cut, rather than place the full burden on primary producers.

The order . . . The commission announced its decision informally from the bench in late February. The ruling: No well could produce during March more than 89 per cent of its January runs.

However, the three commissioners held off signing the official order for more than 2 weeks while they heard complaints from scores of water-flood operators and others who said they would be hurt irreparably by the ruling.

When the order finally became official in mid-March, it provided that water floods which are operating on an ascending productive rate would be allowed to present evidence that a cutback would damage the reservoir. If the commission agreed with the evidence, then it would grant an exception for the month of March—and the operator would be expected to make up any overproduction later.

At informal hearings during the first 2 weeks in March such exceptions were granted to some 40 to 50 operators whose projects are on the ascending productive curve.

Actually these exceptions, while important to the individual operators, will not increase the over-all production for Oklahoma by a great amount. Conservation Director Massena Murray estimates the increase at some 6,000 to 10,000 bbl. per day.

In joining other states in lowering production, Oklahoma hoped to reduce its output of 552,000 bbl. per day in February to 504,000 bbl. in March. For the first 8 days of the month the runs averaged only 496,000 bbl., although virtually none of the water floods were cutting back during the period. The commission's formal order was not released until March 14.

The state has about 135,000 bbl. per day of production from secondary-recovery projects, and about 95 per cent—some 450 projects—are water floods.

Murray made it clear that the commission will move with caution in ordering secondary-recovery operators to reduce their production.

"To arbitrarily cut them back would be injurious," he said. "It should be done with caution and with some engineering data behind it."

What next? . . . While most operators will be able to live with the commission's order during March, the question which faces them—and the commission—is this: Will it have to be continued in the months ahead and, if so, will some of the water-flood projects really get hurt?

As it stands now, floods on the rising curve can produce at capacity and make up the overproduction later when the floods are on the downward curve.

But this is not an automatic solution. If the downward curve is not sufficient, then the injection rate for the flood may have to be curtailed.

This problem will be faced immediately by many flood operators whose projects already are on the downward curve. For some of them the problem is solved without pain because their production in March will be sufficiently below January's production to take care of the 11% cut.

But in cases where the drop is not this great, either the floods must be slowed down or the overproduction stored until the commission allows capacity runs again.

The commission is not saying what it will do for April—or May, or any other succeeding month.

"This is just for one month," Commission Chairman Ray C. Jones said last week. "We don't know about next month. If we continue to hold production down, we may have to take a different view of water floods. But given a length of time, we can adjust these things."

Jones warmly defended the commission's decision to prorate water floods.

"Sure it was drastic," he said. "It

PIPELINE

Pacific Lighting Gas Supply Co. plans to build a 128-mile, 34-in. line from Topock, Ariz., where it receives gas from the San Juan basin system of El Paso Natural Gas Co., to Newberry, Calif. The project, which has not yet been placed before FPC, is scheduled for completion November 1, 1959.

R. H. Fulton & Co., Lubbock, expects to wind up construction on Four Corners Pipe Line Co. this week. Fulton laid about half of the 635-mile, 16-in. main line from Aneth, Utah, to Los Angeles. The system will take oil from southeastern Utah and northwestern New Mexico to Los Angeles area refineries. Initial capacity will be 70,000 bbl. per day.

Saskatchewan Power Corp. will spend $16 million this year to bring Hatton-Many Islands field gas on the Saskatchewan - Alberta border to the southern part of Saskatchewan. SPC plans 200 miles of main line and 75 miles of gathering lines. Principal projects are a 90-mile, 14-in. line from Hatton to SPC's Success-Moose Jaw

would have been more drastic the other way. We would have had to cut other wells 45 per cent on top of what they have already been cut. This is an effort to spread it out and let everybody take a share. Next month we will have to take another look."

Producers' view . . . The commission's order stirred again the embers of controversy as to whether curtailment of a water flood will reduce the ultimate production from the field.

One operator contended last week that 90 to 95 per cent of water floods are damaged by curtailment, whether it occurs on the rising or falling curve of production.

"We feel very strongly that a tremendous number of water floods are going to be seriously harmed by this order," the operator said. "The length, so far, is just 1 month. But the longer we are curtailed, the worse it will be."

The same operator said he is so thoroughly convinced of his stand that if the order continues, he may dig open pits to store oil rather than cut the injection rate at his projects.

The extreme pessimism of this operator is not shared by many others.

One company whose water-flood production is among the largest in the state, said the relief granted rising floods "solves the problem, at least on a short-range basis."

"But," he warned, "on a long-term basis, it would not. There would be resistance if it continues. We have consistently taken the position that a water-flood property cannot be indiscriminately restricted without damage to the reservoir and loss of recovery. But it's hard to generalize. It depends on the stage they are in."

Need for change . . . Another large Oklahoma producer takes the position that secondary-recovery projects should be required to assume their share of the production cuts along with the primary producers.

His complaint, however, is that the Oklahoma Corporation Commission has established no basic policy that will let water-flood operators know where they stand.

"We would like to see a planned, worked-out method of operation," he said, "instead of coming into this thing in March and floundering around. I don't like this informal method of handling this thing. There is a danger of being inconsistent."

The spokesman said his company would like to see water-flood allowables based on a per-well production yardstick.

The present hastily devised system is based on previous runs of an entire lease or project, and some water floods don't have a run history "for a decent allowable."

Any system, however. would have to make provision for operators to go before the commission for exceptions in cases where an allowable cut definitely would reduce ultimate production.

Coming up . . . Actually the Corporation Commission is working on a new production plan for secondary-recovery projects—as well as other types of production. But the plan has been kept under wraps for months.

A new set of field rules was drafted for release to the industry last autumn but was held up because of differences over the water-flood provisions. The commission recently obtained expert advice from a group of engineers, and the rules should be ready for release soon.

Public hearings will be held before they are formally adopted, and the battle over water floods may be fought out in the open at that time.

BRIEFS . . .

line and a 40-mile, 12-in. extension from Moose Jaw to Regina.

The provincial government agency will build distribution systems to serve Maple Creek, Estevan, Weyburn, and several smaller communities. Crescent Corp., Tulsa, and Britalta Petroleums, Ltd., have received a permit to export 210,000,000 M.c.f. of Many Islands gas to Saskatchewan at a starting price of 10 cents per M.c.f.

Salt Lake Pipe Line Co. is expanding its products system from Salt Lake City to Spokane, Wash. New pumping units either completed or scheduled for completion next month are 900-hp., Corinne, Utah, Hood Construction Co.; 2,000-hp., Juniper, Idaho, Hood Construction; 1,000-hp., Murtaugh, Idaho, Hood Construction; 900-hp., Glenns Ferry, Idaho, Hood Construction; 800-hp., Boise, Bryan & Haworth Construction Co.; and 800-hp., Huntington, Ore., Ryan & Haworth.

Pioneer Natural Gas Co. will complete 43 miles of 4 to 10-in. pipeline in the Texas Panhandle and West Texas by April 1. A subsidiary, Pioneer Gathering System, Inc., Amarillo, plans to lay 44 miles of gathering lines in West Texas by November 1, if Federal Power Commission approval is obtained. Pioneer will tap gas supplies in Buckhorn, Vinegarone, Mt. Ketchum, Tillery, and Mentzon fields.

A $25,000,000 natural-gas underground storage project is planned for the Leidy and Tamarack areas of north central Pennsylvania. The program will be carried out by New York State Natural Gas Corp., Transcontinental Gas Pipeline Corp., and Texas Eastern Transmission Corp., pending FPC approval.

New York Natural, with 50% interest, would operate the storage. Ultimate capacity would be 105,600,000 M.c.f. This would include about 45,000,000 M.c.f. of cushion gas.

Activation of the Needles, Calif., compressor station has jumped capacity of the recently completed 30-in. gas line from Topock, Ariz., to Newhall, Calif., from 225 to 325 million cubic feet per day. Three 2,000-hp. compressors have been put into regular operation at the Needles station. Three more are planned for the future by the line's owners, Southern California Gas Co. and Southern Counties Gas Co.

Also for Pipeliners . . .

IN THE NEWS: A few bright spots are appearing in oil industry's attempt to get production and demand in balance (p. 85) . . . Midwestern Gas Transmission seeks FPC permit to rush $45-million line into Chicago area by next January (p. 92) . . . Northern Natural Gas also is making a move to serve the Illinois market (p. 92) . . . Studies of internally coated gas pipelines indicate flow efficiency results (p. 100) . . . Colorado Interstate customers refuse to accept $24-million refund offer (p. 101) . . . A new gas bill is being talked to exempt only small independents from regulation. Hopes for Harris-O'Hara bill are fading fast (p. 102) . . . Examiner ignores FPC policy on Memphis case in ruling on rate case (p. 102) . . . Shell plans new crude line from Bachaquero field to Puerto Miranda terminal in Venezuela (p. 105) . . . New pipe line and terminal facilities are part of Kuwait Oil expansion looking to 2½-million-barrel-daily production by next year (p. 106).

Producers Due Imports Relief Soon

A CUTBACK in allowable imports may come before Easter.

This was the feeling in Washington last week amid signs that steps to improve the voluntary control program soon will be suggested to President Eisenhower by the cabinet fuels committee.

The cabinet committee met again last week to go over its problem. It reached no decisions. But it received a number of ideas for strengthening the program. These are now under study.

The group is making every effort to keep import controls on a voluntary basis. To succeed, however, it must come up with an effective formula before the House ways and means committee gets down to writing the extension of the Reciprocal Trade Act.

The House committee's hearings are due to wind up around the end of this month. But it made room late last week to hear the heads of three states who wanted to talk about oil.

The governors—Daniel of Texas, Gary of Oklahoma, and Simpson of Wyoming—all strongly support the move for specific legislation to limit imports.

Ernest O. Thompson of the Texas Railroad Commission also is joining this camp. Thompson, long a supporter of the voluntary program, now views mandatory controls as the only effective way to stem the tide of imports.

The Caracas conference . . . Thompson went to Venezuela early this month with Capt. M. V. Carson, Jr., program administrator, and Asst. Sec. of State Thomas C. Mann to discuss the import problem.

He said upon his return last week that the junta in control of Venezuela is firmly against any cutback in production to help solve the U. S. problem.

A joint statement issued in Caracas after the talks gave the separate views of the U. S. delegation and the Venezuelan Government.

The statement held that the major reasons for imbalance in supply and demand were development of new sources of oil and a general economic recession. The delegation said these had more influence on the situation than imports.

The U. S. group argued that neither production nor imports should be allowed to reach levels that would discourage maintenance of a healthy economy in oil-producing nations.

The Venezuelan group recognized the influence of the economic situation on the world market. But it said that obligations of the different countries under their particular economic, social and political conditions should be considered.

Venezuela would face an economic and social crisis if oil production is seriously reduced, spokesmen said. They expressed the hope that no new restrictive measures affecting Venezuela would be taken by the U. S.

Talks in Ottawa . . . It was learned at the State Department that talks have been held with Canada as well as with Venezuela.

But there is no plan for a "Western Hemisphere compact" under which the three countries would reduce production to meet the control program, spokesmen declared.

The talks were intended only to exchange information and views on production and import problems.

"You couldn't expect them to be very happy at the prospect of having to cut back because of our situation," one official commented.

The talks led to a little better mutual understanding of the problems, he added.

A department source suggested that Venezuelan officials may have talked tougher for home consumption than among themselves. Similarly, in Canada, the situation is complicated by a federal election coming up this spring.

Candidates for Canadian office are reported reluctant to talk about oil at the moment. As in the U. S., oil has become a hot political issue.

The State Department official explained, however, that oil is not the sole bone of contention in Canada. Other actions by the U. S. have aroused resentment in Canada. Oil merely was added to the list last January when the import program for District 5 was adopted.

The impending Canadian election, too, will be important to the Borden Commission, which is working on an oil and gas policy. If the present government under Prime Minister J. D. Diefenbaker falls, the commission may be wiped out. Lester Pearson, Diefenbaker's chief rival, has indicated as much.

The talks abroad served to make the different positions of the three nations clear. A State Department source stressed that no effort was made to reach any agreements.

Thus the cabinet committee is not tied to any course of action aimed at meeting the desires of Venezuela or Canada. It is free to take any steps it believes best in the interest of national security.

Reaction to Carson . . . Statements of Carson before a Texas investigating committee in Abilene supported Washington reports that the cabinet committee is studying a cutback in imports for Districts 1-4.

Carson said such a reduction will be recommended if the committee found conditions warranted.

The cabinet committee's problem is complicated by a combination of these factors:

. . . The list of companies seeking import quotas is long and increasing.

. . . Natural gas continues to cut into oil markets.

. . . Some 200 companies are now exploring abroad and many, sooner or later, will want to bring in oil.

. . . U. S. oil reserves declined last year, although the third largest number of wells in the industry's history was completed.

President Eisenhower also added credence to belief a cutback is coming. The President, in answer to a letter from Texas Senator Lyndon Johnson, said that mandatory quotas on foreign oil should be avoided if possible. At the same time he conceded they may be necessary.

Newcomers . . . The cabinet committee reportedly has settled on a policy of dealing with newcomers to the importing business.

The revised program on which the group is working may spell out for the first time a method for handling new quota requests.

Many of the pending requests for quotas cannot be denied in the interest of fairness and equity. It is likely, however, that many of them will be reduced.

Inland refiners who cannot make direct use of foreign oil may not be given much consideration. There is reportedly no inclination to let brokers get into the importing field.

Just how much of a cut will be made in the over-all import allowable, if that course is adopted, has not been made clear. But the figure of 713,000 bbl. daily appears to have some support.

This would be a drop of about

58,000 bbl. from the present level of 771,400 bbl. a day.

Preliminary figures indicate that February crude imports ran somewhere around 702,000 bbl. daily.

Thus there would be a margin of about 11,000 bbl. over the actual import level. But this would not be enough to take care of newcomers. Established importers would have to be asked to move over to make room for them.

"It's a tough problem," one official commented.

Import Cut No Cure-All

. . . for Texas oil producers, Carson testifies. Recession and falling demand are blamed for oversupply of crude in U.S.

THE AILMENTS of the oil industry won't be cured by a drastic curtailment in crude-oil imports, Capt. M. V. Carson, Jr., told Texans at Abilene last week.

Carson, administrator of the voluntary import control program, was the chief witness in the second of a series of hearings conducted by the Texas Governor's Import Study Commission. The 11-member body currently is gathering information on the effects of imports on the state's economy.

Imports, when placed in proper perspective, play only a minor part in the oversupply picture, Carson said.

"My office has served as crossroads and common meeting point for diametrically opposing views and conflicting interests," Carson said. "Because of this, I have found the oil import problem is neither all black nor all white."

Carson blamed oversupply on several factors, including general lack of demand by consumers, increased production during the Suez crisis, and the present recession.

Program defended . . . Carson believes voluntary controls are working, despite many assertions to the contrary.

Actual imports for the past 5 months have been below levels recommended by the President's special cabinet committee, Carson said.

The approved level of imports, he explained, is one which the cabinet feels will not threaten national security.

"If the cabinet committee finds that circumstances require revision in allocation, I assure you it will so recommend to the President," he said.

Carson said he understood Texas is "taking the brunt" of production cutbacks, while some other states actually increased output.

At an IPAA luncheon in Abilene Carson made one point clear: "Trying to keep imports down is my job, contrary to what some of the people down here seem to think."

Capt. M. V. Carson
". . . the oil import problem is neither all black nor all white."

Other views . . . The Governor's Commission heard residents report that West Central Texas is suffering more than most other sections.

Witnesses ranged from Olin Culberson, Texas Railroad Commission chairman, to "grass roots" members of industry.

James S. Lauderdale, president of the West Central Texas Oil and Gas Association, said his area leads in unconnected wells, trucked oil, oil without market, and purchaser proration.

C. T. McLaughlin, of the Sharon Ridge area, said only one-half of the state allowable is now being taken. Only one rig is running at Sharon Ridge.

One Abilene service company reported a 60 per cent dollar-volume decrease from 1955.

Eighty-nine rigs are now running in West Central Texas, compared with about 170 at the peak.

Crude Output Cut

by Superior in U.S. fields. No change in Venezuela.

SUPERIOR OIL CO. is cutting its California production by 30 per cent because of heavy oversupplies of crude in the state.

The California cut will amount to about 6,000 bbl. daily. Because of lower allowables in other states, the company's domestic production for all states is dropping to around 61,000 bbl. daily, compared with 78,000 to 80,000 some 6 months ago.

Within 60 days the figure will be down to about 58,000.

Disclosure of Superior's production plans was made in an unprecedented press conference held last week in Los Angeles by the company's president, Howard Keck. In the past, Superior has seldom made public announcement of its activities.

Keck said purchasers have asked Superior to cut deliveries in some cases, and in others the company has been notified that expiring crude contracts would not be renewed.

Keck was asked at the press conference what effect the Four Corners crude line to Los Angeles will have on California production when the line starts operating next month with a throughput of about 40,000 bbl. daily. He speculated the Four Corners crude would displace imports, not domestic production.

Keck said Superior would continue its Venezuelan drilling at its present pace and that the company has been able to sell its Lake Maracaibo crude up to this point.

Big Dakota Project Approved

NORTH DAKOTA's first unitization program has been approved.

The state industrial commission has given the green light to a giant pressure-maintenance project for the neighboring fields of Tioga and Beaver Lodge.

Amerada Petroleum Corp. and 20 other operators plan to inject water into the Madison lime in a program involving 458 wells on 40,436 acres.

Operators hope to boost ultimate recovery from an estimated 132,000,000 bbl. through primary means to an estimated 258,000,000 bbl. through water injection (OGJ, Mar. 10, p. 89).

This is about 72 per cent of the estimated 358,000,000 bbl. of original oil in place. The two pools had produced 35,300,000 bbl. up to January 1, only about 10 per cent of the original oil in place.

State Studies Lease Plan

. . . for California tidelands. Royalties would range from 16⅔ to 50 per cent. Cash bonus bidding is likely.

A SAMPLE lease form for state-owned tidelands is being circulated among California oil companies prior to being submitted to the State Lands Commission some time this week or early in April.

This lease form, which represents the composite thinking of industry, the staff of the Lands Commission, and consultants hired by the commission, contains these important features. They are:

. . . **Annual rental** of $1 per acre. Previous state leases did not call for this annual rent.

. . . **Royalties** will be on a sliding-scale basis. They will begin at 16⅔ per cent on wells producing 100 bbl. daily or less and will range up to a maximum of 50 per cent on wells producing 500 bbl. or more daily.

. . . **Well spacing** calling for 20-acre spacing in pools above 8,000 ft., 40-acre spacing for pools deeper than 8,000 ft., and 320-acre spacing on gas or condensate pools.

All told, the lease form includes 24 different provisions, plus 3 exhibits having to do with details on such things as royalty and bonus provisions.

Still not definite are the parcel sizes and bidding technique to be used.

However, cash bonus bidding on wildcat acreage is considered a cinch. Parcel sizes will probably be held to the 3,880-acre limit recommended by the commission's consultants, Dr. Herman H. Kaveler, Tulsa, and Keplinger & Wanenmacher, also of Tulsa.

Wildcats first . . . Up to this point, all the discussions, meetings, and hearings have been concerned almost entirely with wildcat acreage. This is because the staff of the commission is trying to clear the path for bidding on some 54,000 acres of wildcat tidelands between Point Conception and Elwood off Santa Barbara County.

The staff plans to ask for the commission's go-ahead on advertising for bids on the 54,000 acres at the same time the lease form is submitted for their approval.

Speculation is that the commission will probably go along with the recommendations of its consultants again, offering only alternate parcels within the 54,000 acres in a checkerboard policy.

According to a member of the commission staff there is an excellent chance that acreage considered proven will be put up for leasing on a high royalty bid basis instead of cash bonus. No proven acreage is in the process mill for bidding at this time, however.

Thorough study . . . In addition to being circulated among the industry, the prospective lease form is being studied by the state attorney general's office. Following the attorney general's study, the lease, with any changes, will be gone over again by the industry, consultants, and commission staff before being presented to the commission.

As it now stands, there are four points in the lease which are still considered controversial and subject to revision. They have to do with the annual rental provision, determination of wellhead prices, a dehydration allowance, and provisions for indemnification of the state.

When asked what he thought of the lease as it is now being considered, one executive of a major company active in offshore coring, said:

"We can live with it."

Other provisions . . . Some of the more important provisions of the lease form are:

. . . **No drilling from piers.** Offshore structures must be able to accommodate at least 20 wells. East of Gaviota, which is about in the middle of the 54,000 acres now under consideration for leasing, offshore structures must be at least 1 mile from shore.

. . . **Drilling must start** within 3 years after signing the lease. Until commercial production is found, or the lease given up, the operator must spud in a new wildcat within 120 days after cessation of drilling on the preceding test.

For well-spacing purposes, dual completions can be counted as separate wells. The state can order the lessee to drill an offset well to private production where such production is within 500 ft. of the boundary of the state lease.

. . . **Lessee may quitclaim** the lease in parcels of 10 acres or multiples thereof. Leases are transferable in whole or part with state approval.

. . . **A flat 16⅔% royalty** is imposed on natural gas and natural-gas liquids except for those used in operating the lease. Lessee is allowed 5 cents per barrel on royalty oil treated or cleaned.

. . . **The state has the right** to order secondary-recovery or pressure-maintenance programs, but the state must pay its fair share of the costs.

. . . **Leases will have a primary term** of 20 years, plus the life of the field if it is still producing in profitable quantities after the primary term. On surrender of the lease, the state can keep any permanent improvements, except those which are salvageable or reusable by the lessee.

. . . **The state will control** well spacing and production rates on an MER basis. All surface and bottom-hole locations must get state approval.

In addition, there are detailed provisions requiring the lessee to keep and make available to the state complete coring, drilling, logging, production, and sales records on the lease. Unit operations will be approved where it is in the best interest of the state. Any upland drill sites must be recessed and screened from view.

Railroad Defeated

in antitrust case. Oil firms won't have to ship via NP.

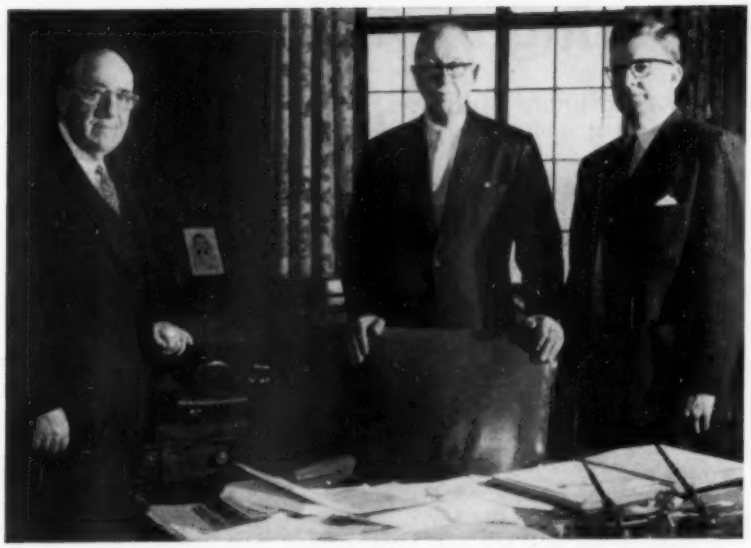
OIL AND GAS producers who have bought or leased lands from the Northern Pacific Railroad Co. can no longer be forced to ship products of the lands on lines owned by the railroad.

The U. S. Supreme Court has held in a 5-3 decision that sale or lease contract provisions requiring shipments of products of the lands over Northern Pacific rails are unreasonable restraints of trade in violation of the Sherman Antitrust Act. The majority opinion said other means of transportation are available and that NP's purpose "obviously was to fence out competitors . . ."

The high court's decision upheld a ruling by U. S. District Judge George H. Boldt at Tacoma, Wash., in a suit filed against the railroad by the Justice Department in 1949. The railroad appealed the lower court decision.

The railroad received more than 39 million acres of public lands along its tracks by acts of Congress in 1864 and 1870. NP had disposed of all but 2,700,000 acres by 1949. It told the Supreme Court it sold more than 90% of the lands without the tie-in shipping requirement.

The railroad operates in Oregon, Washington, Idaho, Montana, North Dakota, Wisconsin, and Minnesota.



LAST DAY finds Robert E. Wilson closing his roll-top desk as . . .

Indiana Standard Chairman Retires

AFTER 35 YEARS' company service, Dr. Robert E. Wilson last week retired as chairman of Standard Oil Co. (Ind.).

Frank O. Prior (center), president, moved up to chairman of the board and chief executive officer after Wilson's retirement. Prior is the third chairman in Standard's 69-year history.

John E. Swearingen (right), an executive vice president, succeeded Prior to become Standard's ninth president (OGJ, Mar. 3, p. 219).

Labor Pact Signed

by Esso workers at Bayway. Eight-cent raise granted.

SOME 1,600 employes of Esso Standard Oil Co.'s Bayway, N. J., refinery were working under a contract this week for the first time in 30 months.

The new 2-year contract, signed by management and Independent Petroleum Workers Union, provides hourly rate increases averaging 8 cents per hour per man, and other economic improvements.

The contract's provisions for production and maintenance employes include:

. . . **Raising process operators'** rates from $3.37 to $3.47 per hour, and assistant operators' rates from $3.07 to $3.13.

. . . **Paid holidays** increased from 7 to 12, except when they fall on Saturdays.

. . . **Features for security** improvements and changes in grievance and arbitration procedures.

The new contract was approved after 8 months of negotiations. It is the first contract between the company and IPWU since the previous one expired in August 1955.

PROCESSING BRIEFS . . .

Standard Oil Co. of California has officially announced its participation with Irving Oil Co., Ltd., in a 36,500-bbl. refinery planned at Saint Johns, N.B., on Canada's east coast.

The plant, which will operate on imported crude provided by Standard of California, is scheduled to go on stream in 1960. Bechtel Corp. will build the plant.

Operating company for the plant will be Irving Refining, Ltd., a company jointly owned by Irving Oil and Standard Oil Co. of B.C., a Standard of California subsidiary. Products will be sold through Irving outlets.

Husky Oil Co.'s subsidiary, H. Earl Clack, Inc., Cody, Wyo., has been renamed and expanded. The name was changed to Husky Hi-Power, Inc. It was expanded to include Husky's refining operations and the marketing of asphalts.

Tidewater Oil Co. officials say their Delaware refinery has broken the world's record of 189 days for continuous operation of a fluid coking unit. George C. Caine, Tidewater's eastern division manufacturing manager, said the Delaware unit surpassed the 189-day record on March 7 and has been adding to it daily.

Pontiac Eastern Corp.'s new 2,500-bbl. UOP Platforming unit and 1,500-bbl. Unifining unit are now on stream at the company's 14,500-bbl. refinery at Purvis, Miss. The dual-purpose Unifining unit processes thermally cracked heavy naphtha boiling in the range of 325° to 450° F. and treats heavy distillate for fuel-oil improvement. The Platformer is charging a 50-50 blend of thermally cracked heavy naphtha and a 200° to 400° F. cut of straightrun naphtha derived from Louisiana crude. Universal Oil Products Co. designed and engineered the two units.

Gulf Oil Corp. has placed on stream a 26,000-bbl. Platforming unit at its Philadelphia refinery. The unit, second of its kind at the refinery, was designed by Universal Oil Products Co. and erected by Procon, Inc.

Also for Refiners . . .

IN THE NEWS: A few bright spots are appearing in the oversupply picture for oil. Production, refinery runs, and product stocks are down since January (p. 85) . . . Growth of domestic refining capacity shows signs of leveling off, a good sign in view of the capacity-demand spread. Capacity now totals 9,019,381 bbl. daily (p. 88) . . . Canadian refiners may be overbuilding (p. 91) . . . Imports cuts may come by Easter with administration still favoring voluntary approach. Carson warns the reductions won't be cure-all for oil problems (p. 96) . . . Kuwait becomes a major Middle East refining area overnight with opening of expanded refinery (p. 106).

PLUS THESE TECHNICAL REPORTS: Selected crude-evaluation charts for 47 crudes over the world (p. 110) . . . Annual survey of capacities of operating refineries (p. 159) . . . Canadian operating refineries (p. 197) . . . Survey of new refinery construction (p. 200) . . . Shutdown plants in the U. S. (p. 206).

Internal Line Coating

. . . may boost gas flow efficiency. Big future predicted. Studies indicate higher throughput of 8 to 11 per cent.

INTERNALLY COATED gas-transmission lines may be the rule rather than the exception in the not-too-distant future.

And they will not be solely for the purpose of solving corrosion and deposition problems. The internal coatings will be used to increase throughput.

This switch to internal coatings was forecast at the annual meeting of the National Association of Corrosion Engineers in San Francisco last week. The speaker was R. M. Johnson of Coast Paint & Lacquer Co., Houston.

Today, about 1,000 miles of large-diameter gas lines have been coated internally, with most of the work having been done in the past 3 years. There is now no definite proof that the coatings increased throughput. But such data may soon come to light, Johnson declared. And when it does, use of internal coating probably will be totally accepted.

The friction factor presented by the interior surface of coated and uncoated pipe is hard to define in terms of relative throughput. Recent work has theoretically established that higher efficiencies in the range of 8 to 11% can be had from use of internal coating. In citing these limited studies Johnson said it has been found that:

. . . **Rust-free pipe** as delivered from the mill had an average effective surface roughness of 0.7 mil (0.0007 in.).

. . . **Pipe exposed** to the atmosphere for periods of 6 to 24 months had an average roughness of 1.3 mils.

. . . **Pipe coated** with an amine-cured epoxy coating was found to average 0.28 mil after it had been in service for periods ranging from 3 months to 2 years.

Translating these roughness factors into calculated flow efficiencies, using very smooth commercial pipe with an effective roughness of 0.45 mil as 100%, Johnson said:

"If this comparison is valid, an average increase in efficiency of 8% will be approached by coating commercial pipe as it is produced at the mill. A difference in flow efficiency of 11% could be expected if coated pipe is compared with uncoated pipe exposed to the atmosphere for 6 months."

In addition to these potential increased throughputs, internal coating of gas transmission lines also can be justified through:

. . . **Protection in storage.** Coated pipe shows no deterioration after being in storage for 2 years.

. . . **Dusting in lines.** Coating efficiency leads to delivery of cleaner gas, eliminating rust and scale damage to expensive valves.

. . . **Improved inspection.** Defects not visible on the bare pipe have been found after the pipe had been internally coated.

In discussing in-place coating of pipelines, Johnson said more than 5,000,000 ft. of pipe had now been treated. Epoxy resin coatings today are the most popular, he said. Epoxy coal-tar coatings may be adaptable to in-place coatings after further studies of temperatures have been made, he added.

Pickton Units Join

to operate field-wide under Texas commission approval.

BIG PICKTON FIELD in northeastern Texas will soon be operating as a single 7,141-acre field-wide unit.

The Pickton unit No. 2 operating committee has been approved by the Texas Railroad Commission to consolidate the two units now in operation so as to improve operating efficiency and increase recovery.

Gas repressuring, now conducted by both units, will be continued and better coordinated.

Pickton, in Hopkins County, now includes 166 wells. It had produced 12,700,000 bbl. of oil up to January 1 since the discovery in 1944.

The first unit was set up early and gas repressuring began in 1949. In 1950, the field was extended to the east—the extended area proving to be larger than the original field. Repressuring was begun in the new part of the field under the Pickton joint-operating agreement which took effect in 1952.

Last year Pickton Unit No. 2 engineers decided the gas-injection program would recover about 47% of the oil in place. Water flooding, it figured, would not add enough more oil to make conversion to a flood economical at such a late dae.

The unit estimates it had recovered 37% of oil in place as of January 1, 1958. It thinks that it can produce another 4,000,000 bbl. before the pay is depleted.

With the remaining oil, it feels it should net about 30 billion cubic feet of gas after repaying Humble Oil & Refining Co. an equal volume for that loaned the unit from other fields for repressuring.

Humble, operator of Unit No. 1, backed the merger application.

Deep Pay Found

in southern Mississippi by Larco Drilling and partners.

SOUTH MISSISSIPPI last week got its first deep-sand field to be opened this year. Its discovery brings to 18 the number of fields which have been found productive of oil or gas from Lower Cretaceous horizons in the state's mounting deeper drilling play.

The discovery is 6 miles northwest of Raleigh in northwestern Smith County. It is nearly 8 miles northwest of nearest production, in Raleigh field, a 1957 Lower Cretaceous discovery. Prolific Soso field is 25 miles to the southeast.

The discovery well was drilled by Larco Drilling Co. in partnership with American Petrofina, Inc., and Durbin Bond & Co., and is productive from the Rodessa zone. Pay is perforated at 10,969-72 ft., opposite the bottom of an estimated 10 ft. of effective sand.

Tested through ⅛-in. choke, the well flowed at the rate of 216 bbl. of 38°-gravity oil per day with pressure of 1,575 psi. and gas-oil ratio of 593 cu. ft. per barrel. No salt water was indicated.

The well had been drilled to 12,787 ft. with bottom in the Lower Cretaceous-Hosston zone. Potentially productive sands below the 10,960-ft. Rodessa pay were not commercial.

Ratable Take to Be Appealed

PERMIAN BASIN Pipe Line Co. will appeal the hard-fought Puckett field ratable-take gas case to the United States Supreme Court.

The company filed notice of its intention to appeal with the Third Court of Civil Appeals in Austin.

This is the case in which the Texas Railroad Commission for the first time ordered a pipeline to take gas ratably from producers in a field in contradiction of provisions of contracts between line and producers.

Permian won a District Court decision, then lost in an Appeals Court and the State Supreme Court.

Gas Customers Refuse Refund

. . . of $24 million offered by Colorado Interstate. New demand exceeds $40 million, could force bankruptcy.

THE THREAT of bankruptcy hanging over Colorado Interstate Gas Co. has been magnified by refusal of its customers to accept a $24-million refund offered in settlement of rate cases pending before the Federal Power Commission.

In turning down the refund, Colorado Interstate's customers came back with a counter proposal to raise the refund to nearly $40 million.

The higher figure was agreed on at a Denver meeting of representatives of gas-distributing firms served by CIG and officials of three Colorado communities affected—Denver, Colorado Springs, and Trinidad.

FPC Examiner Samuel Binder on May 8, 1957, recommended a refund of $33 million.

CIG has been collecting rate increases subject to refund since January 1, 1954. The impounded money now amounts to about $67 million, or more than half of the firm's total assets of $130 million.

CIG offered the $24 million in full settlement of natural-gas rate increases in 1954 through 1957. An additional amount would be refunded during the period from last January 1 until the date of settlement.

CIG took the counter proposal under consideration and indicated an answer would be forthcoming soon.

W. E. Mueller, CIG president, has said repeatedly that refunding the $33 million recommended by Binder, coupled with frozen rates, would force his company into bankruptcy.

FPC inaction in CIG rate cases has forced the company to operate since January 1954 without being able to determine its earnings. The firm's last stable financial report to stockholders was issued later in 1954.

Slim-Hole Well Sets Record

STEKOLL Petroleum Co., Dallas, last week claimed the title of world's deepest slim-hole pumping well for its J. W. Frost in Buckshot field of Cochran County, West Texas.

The well was completed for 140 bbl. of oil daily from the San Andres through perforations at 4,988 to 5,000 ft. and 5,028-40 ft.

The 1 Frost, about 8 miles south of Bledsoe, has 2½-in. tubing set and cemented at 5,140 ft. as production casing, and a "spaghetti" string of 1-in. as rods and/or tubing.

Stekoll Petroleum, a veteran in slim-hole completion work, figures it saved $10,000 in casing costs alone by using tubing in the well instead of the conventional 5½-in. production string.

How it works . . . The 1 Frost is being produced by a hydraulic-type pumping unit operating with a 12-ft. stroke at the surface.

The 1-in. acts as a string of sucker rods except that oil is produced through it rather than around it. The bottom-hole pump is a conventional metal-to-metal insert pump with a slip-set holddown for the standing valve. The pump rides in an 18-ft. barrel on the bottom of the 2½-in.

The spaghetti string is coated internally with plastic to prevent paraffin buildup and clogging.

Hole size opposite the pay in the 1 Frost is 6¾-in. Contractor on the project was Western Drilling Co., Lubbock, Tex.

Objective: Economy . . . Marion Stekoll, president of Stekoll Petroleum, was one of the first U. S. oil producers to go almost exclusively to slim-hole completions.

He still is one of few who makes such heavy use of the technique.

Stekoll first used the method to produce from a 1,000-ft. pay in Bolton field near Independence, Kans., in 1942. He has been going steadily deeper with it ever since—first to 1,200 ft. at Corsicana Shallow field, then to 3,200 ft. near Borger in 1955, and now to below 5,000 ft. at Buckshot.

Economy, of course, is his prime motive. The slim-hole completion, he says, cuts costs about in half for a 1,000 to 1,200-ft. well and saves about one-third of the conventional completion outlay in 3,000-ft. producers.

Stekoll lays the lack of adoption of the technique by operators generally to a fear of mechanical troubles.

"But in more than 200 such wells we have drilled and completed in such a manner, we have never lost a single one due to mechanical failure either in drilling or operation," he says.

New Illinois Pool

is developed quickly after discovery made in January.

THE ILLINOIS BASIN, quiet for many months, has a new exploratory development in Jasper County, Illinois, near the Indiana border.

Small independents discovered Gila pool in January and have quickly added development wells, despite foul weather during the past few weeks.

Nearly a dozen wells have been completed, or are nearing completion, and all of them have excellent potentials. The pool, 7 miles northwest of Newton, produces in the Rosiclare and McClosky limes of Mississippian age.

Four extensions to the pool were added this month. Harvey & Poppenhouse has a McClosky discovery prospect with good recovery on drill-stem tests at its 1 W. O. Diel.

The 1 Charles Woodward, drilled by Sam Tipps, made 312 bbl. of oil per day from the Rosiclare at 2,834-45 ft. and from the McClosky at 2,845-53 ft. on pump.

The 1 Beard-Kibler, drilled by S. C. Taylor and Wayne Misener, pumped 200 bbl. of oil per day from Rosiclare at 2,800-40 ft.; and J. Frank Hinkle's 1 Roy Lee pumped 217 bbl. from the Rosiclare.

All wells are completed on pump without acidizing.

New locations in the fast-growing field will be drilled by M. C. Milam and B&B Oil Co. Other operators in the new play include Virgil Helgen, Schaefer Oil Co., and Edward Lee Dolly.

New Gas Bill Designed

. . . to help small natural-gas producers. Sponsors feel it's the best substitute for Harris-O'Hara proposal.

BEST BET for natural-gas legislation this year now appears to be a bill exempting only small independents from regulation.

The bill would affect only producers with an output of less than 2 billion cubic feet per year—about 5,500,000 cu. ft. per day.

Efforts to work out an agreement paving the way for passage of the Harris-O'Hara bill are still going on. But Rep. Joseph P. O'Hara (R-Minn.) earlier this month said the measure was dead. And last week similar views were expressed in the Senate.

The move to take the smaller producers out of the hands of the Federal Power Commission was sparked by Sen. Russell B. Long (D-La.). Together with Sens. Joseph S. Clark (D-Pa.), Estes Kefauver (D-Tenn.), and Ralph Yarborough (D-Tex.), Long sponsored the necessary legislation.

"I am a realist," Long told the Senate in explaining the bill.

"Since the day when the Republican National Committeeman from Texas, Jack Porter, sent out requests for contributions to a fund-raising dinner in Houston for the Republican Party, the Harris-O'Hara bill has been as dead as a door nail, insofar as this Congress is concerned."

Long told the Senate of the plight of the small producer. Long delays before the overworked FPC, longer delays in getting court decisions, are hurting the small producers, he said.

The bill will not make the big oil and gas companies happy, Long admitted. But he called on them to support the measure in their own long-range interest.

Kefauver and Clark said they were opposed to the Harris measure, but would support this move to remove what they called an undue discrimination against the smaller operators.

Harris bill chances . . . Clark disclosed that Long has agreed not to support any move to pin the Harris bill on his measure.

Emphasis on the Harris bill is now based on the "antidepression" value of a free gas industry.

Carrying a provision offsetting the Memphis decision, the bill could quickly open up $1 billion in pipeline construction, supporters say.

At least that much new line has been shelved because of the Memphis decision, it is said. There is little chance of a Supreme Court review before next fall and equally little chance of any widespread expansion until a final opinion comes down.

Time, however, is now running against the measure. The current session of Congress has little more than 4 or 5 months to go. Even if the bill was to be passed by the House—which many congressmen say definitely isn't in the cards—it would still have to go through the Senate committee.

And in the final months of the session there will be little inclination to press any measure as highly controversial as the Harris bill.

Examiner Ignores FPC Policy in Rate Case

THE MEMPHIS DECISION is showing how it may hit the gas pipelines where it hurts most—the pocketbook.

A Federal Power Commission examiner last week gave the industry a good idea of what to expect unless, and until, the Supreme Court or Congress reverses the District of Columbia Appeals Court.

The examiner said:

"Although a rate increase proposal by an interstate natural-gas pipeline company may be just and reasonable, it must be disallowed because of the so-called 'Memphis' decision, in which a U. S. Circuit Court of Appeals held that a company could not avail itself of the filed rate-schedule procedure to make unilateral changes subject to FPC approval under Section 4 of the Natural Gas Act unless it had the consent of its customers."

That ruling, by Presiding Examiner William J. Costello, would cost Michigan Wisconsin Pipe Line Co. $4 million a year if upheld by FPC. This was the amount asked in an 8.4 per cent wholesale gas rate increase.

Costello's ruling is expected to be reviewed by the full commission, either on its own motion or on appeal by the company. It directly challenges a position taken by the FPC last month.

At that time the FPC denied a motion to dismiss a pipeline rate increase. The motion had contended the increase would conflict with the court ruling. But the commission said it intended to await either a final Supreme Court opinion or action by Congress before making a policy based on the Memphis case (OGJ, Feb. 3, p. 70).

The FPC earlier had allowed some rate increases to be acted upon since the November, 1957, decision.

Costello, in his decision, told the pipelines the FPC cannot act on Section 4 applications unless they are accompanied by a negotiated agreement between the pipeline and its customers.

Costello said the FPC has not announced whether it will shelve pending rate cases until the Memphis case is finally decided or will dismiss them where no agreements have been filed.

He explained, however, that in his opinion intermediate decisions must be made in the light of existing law.

"The dismissal of this rate filing is the only result which may be announced by this decision," he said.

Costello conceded that detailed analysis of the issues in the Michigan Wisconsin case showed the proposed increase to be justified. And, except for the legal block, it would be in the public interest to grant approval.

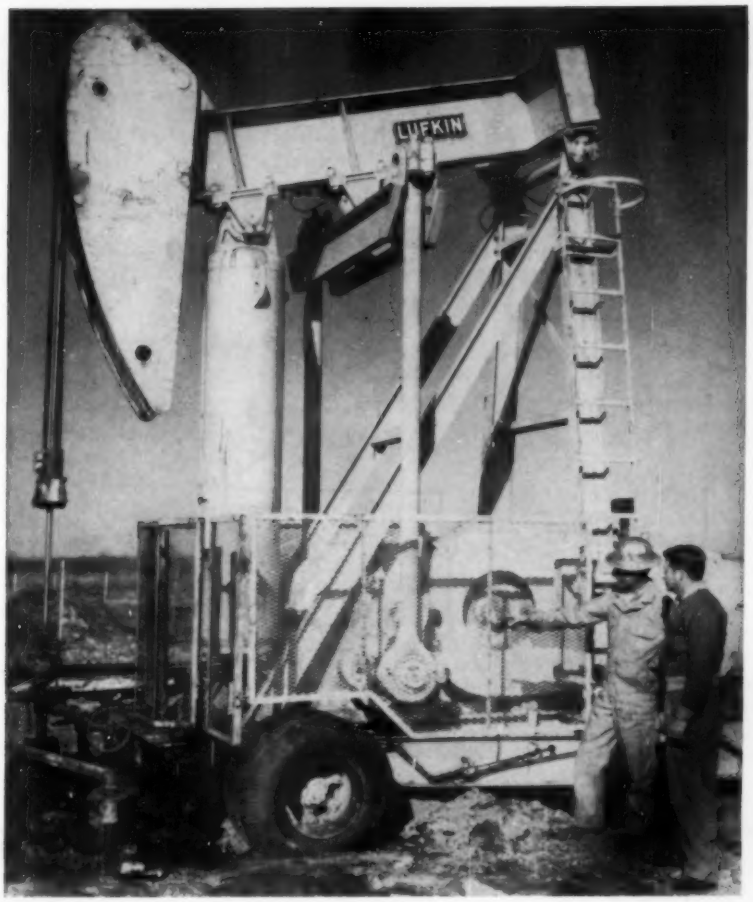
The pipeline company asked for higher rates to 16 wholesale customers. The increase was based largely on increases in the cost of gas supplied by Phillips Petroleum Co. and American Louisiana Pipe Line Co.

Pool Maps Available

EXTRA COPIES of the Journal's 16-page section containing maps of the principal oil and gas areas of the United States are available at $2 each.

The section was a feature of the Journal's annual Exploration Issue, dated March 17.

To obtain reprints of the section, send a check or money order to Reader Service Department, The Oil and Gas Journal, Box 1260, Tulsa.



New slant:

Portable Pumps Save Money

AN AGILE Shell Oil Co. mind recently came up with a small idea which today is hiking production efficiency in the company's Roswell, N. M., division and saving an eye-catching amount of cash to boot.

The scheme was simply to make test pumping units more mobile.

The Roswell division now has two of these units. One, an air-balanced beam-type unit, actually has its own wheels. The other is a skid-mounted hydraulic unit designed to be loaded and unloaded quickly by a truck.

Shell uses the latter for test work on deep wells or on shallower wells where large fluid volumes must be handled. It can be installed and operating in one-half or less of the time required by its conventionally installed units.

Shell figures each mobile test unit will save about $2,000 a year in the cost of moving alone. Easy installation and reduced damage to equipment are added benefits.

Where Shell uses them . . . The portable test pumpers are seldom idle.

Shell engineers, like those with any other producing company, are continually confronted with deciding what type of equipment should be used to lift oil from a well that won't flow.

They've found that most of the time a test pumper, installed temporarily and observed, can best tell them the lift method and equipment size needed to produce the particular well in question.

The mobile test units have other tasks in Shell's Roswell division, too. They are used to:

. . . Evaluate new discoveries.

. . . Take over temporarily to produce a "dead" well when there is a delay in getting permanent pump.

. . . Act as a stimulous for a former flowing well which has undergone remedial work and is expected to again start flowing. The artificial lift generally will cause the well to kick off and resume flowing.

——*Industry* briefs

The recently organized Sunburst Petroleum Co., Los Angeles. has purchased all holdings of Mrs. Anna Aronow in Montana's Kevin-Sunburst oil field.

The deal includes leases on about 4,000 acres. Sixty producing wells are on the leases. The purchase price was not disclosed. The 60 wells produced 2,985 bbl. of crude in December to bring total production to 1,193,066 bbl., since the field discovery in 1922.

The deadline to end gas flaring in Cantuar field of southwestern Saskatchewan has been extended another 2 months to September 1. The field will be shut in if a conservation plan is not in operation at that time. The government said that so far no acceptable plan has been worked out. During 1957 it was estimated an average of 4,000 M.c.f. of gas daily was flared.

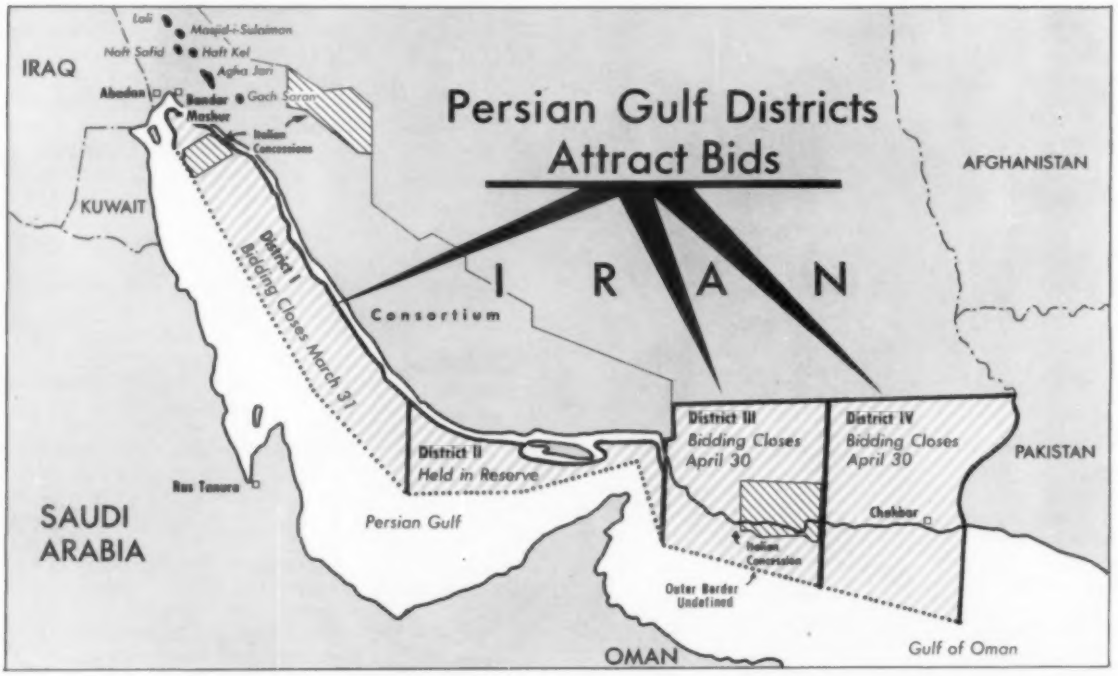
Tennessee Gas Transmission Co., a burgeoning giant of the pipeline industry, was listed last week on the New York Stock Exchange. It also was admitted to trading on the Midwest and Pacific Coast exchanges.

The company, which began operating in 1944, has more than $1 billion in assets, more than 73,000 common stockholders, approximately 18,-800,000 common shares outstanding, and 5,000 employes. Net earnings in 1957 were more than $38 million.

First commercial oil production ever found on an inland salt dome in northern Louisiana was discovered last week by Pan American Petroleum Corp. Pan Am was dually completing its 1 Lee on Minden dome, about 30 miles northeast of Shreveport in Webster Parish. It flowed 201 bbl. of oil in 14½ hours from 7,386-94 ft. and swabbed and flowed 88 bbl. in 24 hours from 6,948-55 ft. The well is about 3 miles from Pan Am's Anna Hudson gas discovery on the Minden dome.

Shell Oil Co. last week brought in in its first productive well in the Gulf of Mexico off the Texas coast. The well extends Mustang Island-Block 889 field, where Gulf Oil Corp. has three deep gas-condensate wells. The block is 3½ miles offshore from Mustang Island, Nueces County.

Shell's well is in small Tract 888, southwest of Gulf's Tract 889. It is rated good for 68,000,000 cu. ft. of gas per day, open flow, with liquid recovery of about 75 bbl. of 51.3°-gravity condensate per 1,000,000 cu. ft. Shut-in pressure is 7,710 psi.



Iran Ready to Grant New Concessions

AN ANXIOUS PERIOD of waiting for concession awards in the Persian Gulf is about to begin.

As many as 22 companies may submit tenders for rights in Iran's District 1 by the time the 1-month bidding period closes March 31. The district covers the country's offshore rights in the upper part of the Persian Gulf.

A month later, April 30, bidding will close for rights in Districts 3 and 4, covering offshore waters in the Gulf of Oman, and adjacent onshore rights in southeastern Iran.

The industry will then wait for the Iranian Government to answer two big questions. The first, of course, is the name of the winners. Besides big internationals, such as Royal Dutch-Shell and Standard Oil Co. (N.J.), and big American independents, Japanese and German firms are pitching hard for concession rights.

The second question is whether the independent - type application plus bonus will stand up well against bids offering the government participation. The independent application plus bonus is the type of bid made last year for rights in Lake Maracaibo.

Under this setup, the company is sole owner of a concession, won on the basis of a high bonus. Under a joint-development bid, the bidding company pays no bonus, but the government becomes a partner in the concession.

District 1 is one of the world's choicest plots of exploration real estate. Big oil fields in Saudi Arabia, Neutral Zone, Kuwait, southern Iraq, and Iran surround the upper Persian Gulf like a big horseshoe. The only parts excluded to bidding are a block previously granted to an Iranian-Italian company, waters surrounding a few offshore islands, and waters within the 3-mile limit.

Districts 3 and 4 do not lie in the heart of the oil producing region. But the area covered is vast and virtually untouched. The only excluded region is a part of District 3, already assigned to the Iranian-Italian company.

District 2 covers the lower part of Iran's Persian Gulf waters. It has been reserved from bidding for the present.

Government requirements . . . Under a new oil law passed last year, National Iranian Oil Co. will be able to consider three types of bids.

NIOC will look at tenders offering it a bonus for rights, but no participation. In this type of deal, a private company can hold a maximum of 12,400 sq. miles.

In the second type of bid, NIOC would be a partner with half interest. In the third type, the government company would be a minor partner, with at least 30 per cent participation. No bonuses are expected when the government is offered an interest. A contract with government participation can cover up to 15,500 sq. miles.

NIOC will rate bidders at 100 per cent of the maximum territory, or 75, 50, 25, or 10 per cent depending on technical and financial ability.

Jersey Standard definitely is trying to win offshore acreage with a "substantial" bonus offer. Its position came to light after Iran and an Italian company reached a concession agreement under which an Italian-Iranian company, SIRIP, was set up. NIOC has half interest in the company.

American companies may be willing to dig into their pockets for something less than the $668 million paid in bonuses and initial taxes for Venezuelan concessions in the past 2 years. But it still may be more than was paid in the big play for rights off Louisiana and Texas in 1955, when companies kicked in $106 million.

Bandini Gets Drilling Rights

. . . in British Honduras. About 2 million acres are either under lease, farmout, or option. Hurndall heads operation.

BANDINI PETROLEUM Co., Los Angeles, has completed negotiations for substantial oil concessions in the southern part of British Honduras.

In a three-way deal with the government and two companies, Bandini obtained licenses, farmouts, and options amounting to 2,011,412 acres. Broken down, they are:

. . . 958,624 acres under exclusive oil prospecting licenses from the government.

. . . 908,173 acres under option from West Caribbean Oil Co.

. . . 144,615 acres on farmouts from Gulf Oil Corp.

About half the area involved is offshore.

A wholly owned subsidiary, Belize Petroleum Co., Ltd., has been set up to handle Bandini's Honduras operations in Belize. B.H. John P. Hurndall former president of Bandini, is managing director of the new company.

The areas involved are immediately adjacent to Guatemala. They are part of the same Cretaceous and Eocene geological trends which are productive in Mexico to the north and have turned up shows in Guatemala.

Offshore, Bandini's holdings are between the shoreline and the barrier reef lying out some 25 to 30 miles.

However, initially at least, Bandini plans to confine its operations to its onshore holdings. Presently, a geological crew is making a surface study of the license areas. Plans call for drilling operations to start by the end of the year.

The deal . . . The agreement between Bandini and the British Crown colony requires a well to be drilled on both of the two main units involved. The oil prospecting licenses run between 2 and 4 years. At expiration of the licenses, Bandini can convert them to oil and mining leases.

Licenses carry an annual fee of $1 per square mile, while annual rental on oil and mining leases varies between 17½ cents to 35 cents per acre per year.

The arrangement with West Caribbean gives Bandini exclusive option to West Caribbean's oil prospecting licenses. Bandini has already received the colony's permission to exercise the option, but no date for actually doing so has been set. West Caribbean is a Los Angeles company headed by A. P. Quirk of Moriqui Exploration Co.

The deal with Gulf on its 144,615 acres calls for one obligation well. Gulf's holdings are oil and mining leases as contrasted with oil prospecting licenses of Bandini and West Caribbean. No date or site has been picked for the wildcat on Gulf's acreage.

New Maracaibo Oil Marketed

IT APPEARS some more new Lake Maracaibo crude has found a home.

San Jacinto Petroleum Corp., one of Venezuela's newcomers with some crude to show for its money and effort, has signed a long-term contract to supply Douglas Oil Co. of California.

The contract, revealed by W. G. Krieger, Douglas president, and Benno C. Schmidt, San Jacinto chairman, will supply Douglas with "a substantial portion" of its crude requirements. The two said they think the first year's deliveries will amount to about 2,000,000 bbl., an average of about 5,500 bbl. daily.

The contract is subject to "government import restrictions." Douglas, a California refiner and marketer, has an import quota for the first half of 1958 for 4,700 bbl. daily.

Douglas operates three refineries in California. Two of its plants, at Bakersfield and Paramount, are rated at 7,000 bbl. daily. A third, at Santa Maria, has a design throughput of 3,500 bbl. daily.

San Jacinto has a 30 per cent interest in Block V-575 in Lake Maracaibo waters near the eastern shore of the lake. The field already established by San Jacinto and its partners may be an extension of the vast Bachaquero field. The group already has completed three good wells on the small block of what was once national reserve acreage.

Block 10 . . . San Jacinto also has a 25 per cent interest in the lake's well-known Block 10. Phillips Petroleum Co. is the operator on this block and has tested a 4,080-bbl. daily well on its first wildcat drilled on the block.

With Venezuelan production cut back sharply because of a depressed demand for crude and products, the primary hitch for new and old companies alike is to find a market for newly discovered production. The new companies, like San Jacinto, which paid extremely high bonuses to obtain new acreage in Venezuela, are the most hard pressed.

Apparently San Jacinto, at least, is on the way to solving this problem.

Shell Line Planned

on east shore of Maracaibo to tie in with huge terminal.

A NEW 440,000-bbl. daily pipeline from Bachaquero field to an $84-million terminal at Puerto Miranda will be built by Cia. Shell de Venezuela along the eastern shore of Lake Maracaibo.

The new system is designed primarily to handle new production. But it will revamp the company's entire lake transportation to some extent. Lake as well as onshore production will be delivered to the terminal through the new line, replacing some tankers now in use and some existing pipelines.

Shell is taking the first steps toward constructing the system by issuing specifications for the Cabimas-Puerto Miranda section.

Here's what's planned for the so-called Terminal del Norte system:

. . . A 112-km. (70-mile) heated-oil line from Bachaquero to Puerto Miranda, with the last 50 km. 34-in. and the remainder 30-in. The 50-km. section from Cabimas to Puerto Miranda will be paralleled by a 31-in. line which will not be heated.

. . . At Bachaquero—A pump station with three 2,500-hp. pumps, six 500-hp. pumps, two 170,000-bbl. tanks, and three 45,000,000-B.t.u. per hour heaters.

. . . At Lagunillas—A pump station with five 2,500-hp. pumps and four 600-hp. pumps, plus three heaters.

. . . At Cabimas—A pump station with three 2,500-hp. pumps, three 2,100-hp. pumps, four 750-hp. pumps, eight 120,000-bbl. tanks, three 170,000-bbl. tanks, and four heaters.

. . . At Terminal del Norte—Two piers with seven loading berths with capacity to load 500,000 bbl. per day; 23 tanks, each with 170,000-bbl. capacity; two heaters; nine 750-hp. pumps; and a 10,000-kw. gas-turbine electric-power plant.

THIS AERIAL VIEW shows Kuwait's enlarged pier and loading terminal. New refinery units are at right. The expansion program, when complete, will permit Kuwait to produce and move up to 2½ million barrels daily.

Kuwait Grabs A Bigger Role With New

KUWAIT, long an oil giant, is becoming a mammoth.

Superlatives are nothing new to the hot little Persian Gulf kingdom, but they've all been applied to oil production in the past. Last week Kuwait became a major Middle East refiner in one jump.

Kuwait Oil Co. added 160,000 bbl. daily capacity to its little 30,000-bbl. daily refinery in one fell swoop. The two new 80,000-bbl. atmospheric crude distillation units represent the biggest single addition to crude capacity in the history of the world's refining industry.

At the same time, Kuwait is working hard to more than double its facilities to produce and ship crude oil for western markets. When this second stage of the expansion is finished some time next year, it may furnish more crude than even the new refining capacity can handle.

The new refining capacity is tied pretty closely to Kuwait's plans to ship more and more oil. The most important product the refinery will turn out is Bunker C fuel for the tankers that will haul her oil. Only the basic crude units were added to the refinery. About 60 per cent of its output will be in fuel oils.

The effect of the straightrun gasoline that will be left over is already being felt as far away as the United States. Kuwait Oil is owned jointly by Gulf Oil Corp. and British Petroleum Co., Ltd.

Gulf plans to ship 8,500 bbl. of straightrun gasoline to the U. S. this month. This will be increased to 12,000 bbl. daily in April and then jumped 25,000 bbl. daily in May (OGJ, Newsletter, p. 1, March 10).

Kuwait Rumors Increase

PERSISTENT INDUSTRY rumors concerning two American oil companies and Kuwait's offshore regions in the Persian Gulf gained impetus last week.

Pan American Kuwait Oil Co. asked Delaware for a charter of incorporation. Just a few days before, a similar Delaware request was made by Hunt-Mideast Petroleum Co. The new Pan American company would be a subsidiary of Pan American International Oil Co. recently formed by Standard Oil Co. (Ind.).

For weeks it has been rumored that Indiana Standard and the Hunt interests of Texas have joined forces for a bid for Kuwait's offshore rights.

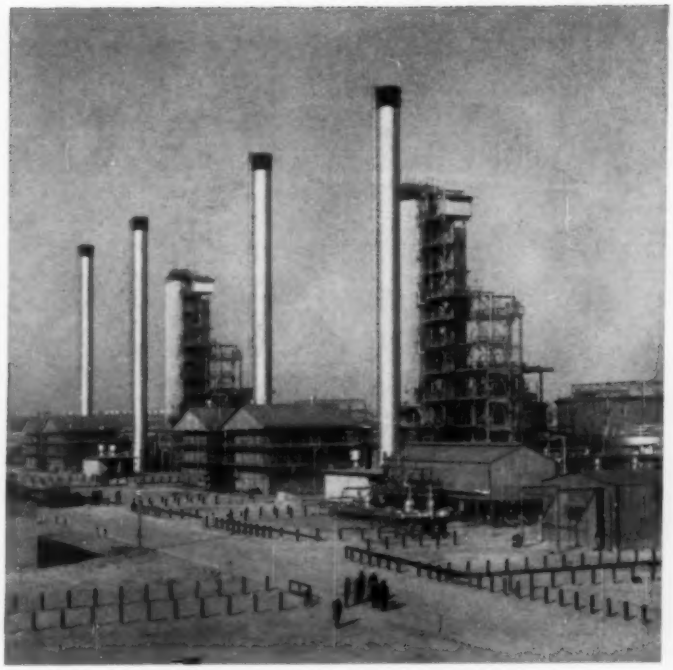
The ruler of Kuwait, Shaikh Sir Adullah al-Salem al Sabah, rarely attends public functions, but he was on hand for the formal dedication ceremonies last week. The shaikh even made a small address to about 3,000 guests assembled for the event before he pulled aside a Kuwaiti flag and revealed a bronze plaque marking the dedication.

He referred to the expansion as "one of the good, blessed fruits of the cooperation and mutual trust existing between our Government and the Kuwait Oil Co." The feudal ruler remarked also that the new refinery units are only "one link" in a long chain of similar expansion projects which, "God willing, will be in the interest of us all."

The refinery . . . Kuwait is the biggest single oil producer in the Middle East, but with only a 30,000-bbl.-daily refining plant, it has ranked in the same class with many of the world's smaller countries that have no production at all. That's all changed by the new units.

Kuwait's refining capacity is now topped in the Middle East only by the Abadan refinery in Iran, Aramco's big refinery at Ras Tanura, and the refinery on Bahrain.

THIS IS one of two 24-in. loading lines built at a 25° angle to skirt a gap in reef.



THE NEWLY DEDICATED crude units make Kuwait a major refiner in keeping with its role as the Middle East's biggest oil producer.

Refining, Loading Facilities

The program to boost Kuwait into the picture as a major refiner began in August 1956. The first of the 80,000-bbl. crude units went on stream in January. The second last week.

The new units were designed by E. B. Badger & Sons, Ltd., London, the same firm that designed the existing refinery. They were built by Bechtel International Corp., which also engineered and built the auxiliary units.

The supplementary units include a gasoline stabilizer for each of the crude units, storage capacity for both crude and products, increased power, steam, and water supply facilities and distribution lines, and expansion of the oil-loading system to the tanker jetty and submarine berths.

Mina al Ahmadi terminal . . . A year ago Kuwait had the largest crude-oil loading terminal in the world. Today it is even bigger, and a second terminal is under construction.

The loading terminal has a jetty that can accommodate eight supertankers at one time. The jetty can easily move more than 1,200,000 bbl. of crude daily into these tankers.

To push this loading rate even higher, Kuwait Oil has in the last 6 months added two more large-diameter submarine loading berths to its system. This involved launching four more pipelines to the subsea berths, two 24-in. lines and two 12-in. lines. A new 32-in. gravity line from the tank farm at Ahmadi serves these new loading facilities.

The new 24-in. lines were an engineering innovation of sorts, too. They were curved at a gradual 25° from the shoreline to pass through a gap in the reef and then laid straight to the offshore loading spot some 7,300 ft. from the beach.

The whole "curved pipe" job was handled by the construction division of the engineering and marine departments of Kuwait Oil, and they think it is a first. Kuwait Oil's engineers know of no other line of this kind with such a curve (upper left photo).

The new pier . . . At about the same time the new offshore loading berths were begun, the company started building a new tanker jetty which it calls the "North Pier," 4 miles north of the big Mina al Ahmadi installation.

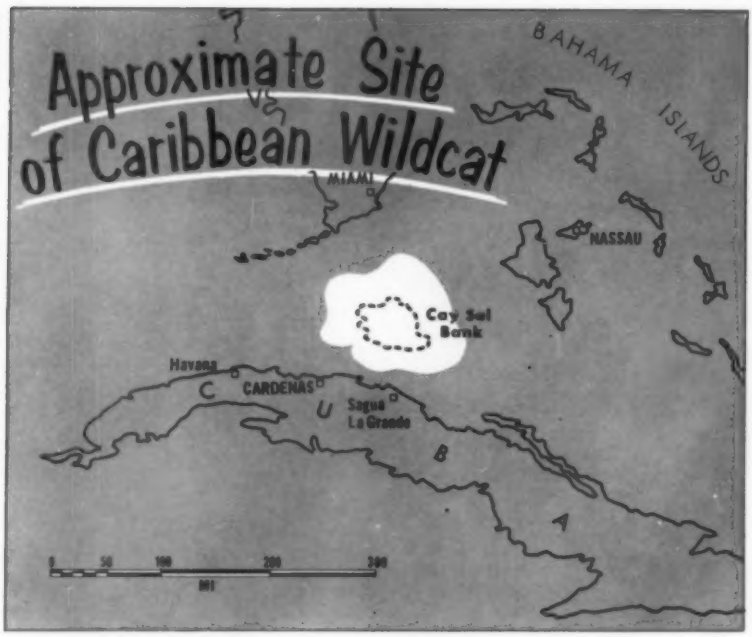
Scheduled for completion about the middle of next year, the new steel-pile pier will be able to handle three 100,000-ton tankers at the same time. This is only the initial plan for the pier, and it can be made even bigger after the first building program is finished.

The pier will be served by a new 70-mile, 30-in. pipeline from the comparatively new producing area in North Kuwait. The big new discovery at Raudhatain, made more than 2 years ago, will furnish the crude for this operation. An active development drilling program is going on in this area, and the new field, possibly with two other newly discovered fields, will be ready to go on production by next year.

Neither Kuwait Oil nor its two owners, Gulf and BP, will place any production figures on the new northern area or any anticipated loading figure on the new pier to serve it. But, the pier itself and the 20-in. pipeline can easily handle another 1 million barrels of oil daily.

Offtake facilities from Burgan and Magaw-Ahmadi fields are being expanded. These fields, with 230 wells, produced 1,120,000 bbl. daily last year.

When all parts of Kuwait's current expansion program are finished, the little Arabian kingdom should be able to produce and move up to 2,500,000 bbl. of crude oil daily under normal operating conditions. It will take lots of tankers, and big ones, to move this much oil. Kuwait plans to be ready to handle them.



Deep Caribbean Test Planned

TWO MAJOR AMERICAN oil companies will put some real blue chips in the pot next month in a major effort to determine if a remote underwater region of the Caribbean is an oil province.

Bahama California Oil Co. (Standard of California) and Bahamas Gulf Oil Co. (Gulf Oil Corp.) have budgeted nearly $3 million for a 15,000-ft. test on Cay Sal Bank.

The well, to be drilled by Zapata Off-Shore Co., Houston, will be one of the most expensive in history. Zapata's self-contained drilling platform will operate in 30 ft. of water.

The three-legged rig, the "Scorpion," has been idle for months because of the slump in Gulf of Mexico oil operations.

Exact site of the test was not pinpointed last week by the two companies, but it is roughly 40 miles northeast of Cardenas on Cuba's north coast and 187 miles southwest of Nassau on a straight line between the two points. It is about 150 miles south of Miami.

The site was selected after 2 years of extensive seismic work over Cay Sal Bank at the cost of more than $400,000. The two firms started a joint marine seismic operation in the 1,700-sq.-mile area just 2 years ago (OGJ, Apr. 16, 1956, p. 134).

The two companies have a dozen joint prospecting licenses in the Caribbean covering 1,932,800 sq. miles. Bahama California Oil will be the operator for the Cay Sal test which will spud some time in April.

Deep Cuban tests . . . Almost due south of the Cay Sal Bank area Cuban Gulf Oil Co. has completed a farmout agreement with The Texas Co. (West Indies), Ltd., for a series of deep tests.

Texaco plans to spend about $3 million as part of the deal to earn a 50 per cent interest in Gulf's 600,000 hectares of concessions.

Most of the Gulf acreage is in Las Villas Province. The first of at least four deep tests has been located near Sagua la Grande.

New Test Spudded in Egypt

A COMPANY wholly owned by the Egyptian Government is drilling its first well on the coast of the Red Sea.

General Petroleum Co. spudded the test at Ras Bakr, using a rig supplied by Russia under the terms of a 5-year Soviet-Egyptian economic-aid agreement.

The new company is drilling on one of the 63 licenses on which it has obtained rights. The permits cover areas on which applications were made 10 years ago by private companies.

Egypt is now the second free-world country carrying on an exploration program with Soviet aid. A Romanian crew is drilling a well in Punjab for the Indian Government.

Bolivian Acreage Scheduled to Be Granted to Fish

A REPRESENTATIVE of Fish International Corp. was scheduled to sign a contract late last week for the 108,000-acre Madrejones concession in Bolivia.

Fish International is an affiliate of Fish Engineering Corp., Houston. Reports from Bolivia indicated several weeks ago that the company, headed by Ray C. Fish, likely would win the concession with its precedent-shattering bid (OGJ, Mar. 10, p. 104).

Fish's offer provided for 50 per cent royalty on gross production in addition to cash and credits totaling some $17,750,000.

Some domestic operators have expressed concern over the Fish agreement. They claim it threatens to upset the traditional 50-50 profit split in foreign operations since the company would be required to pay all operating expenses as well as a bonus from its half of any production.

Argentine contract . . . Fish also has a contract with the Argentine oil agency-Yacimientos Petroliferos Fiscales—to construct two pipelines from Campo Duran field, which is a short distance across the Bolivian border from the Madrejones concession.

One pipeline, 24 in. in diameter and 1,015 miles in length, would move natural gas from the producing area to Buenos Aires. The other, 12 in. in diameter and approximately 970 miles in length, would move crude and products to San Lorenzo.

The Argentine project is under direction of another Fish affiliate, S. A. Argentina, Obras Oleoductos y Gasoductos (SARGO).

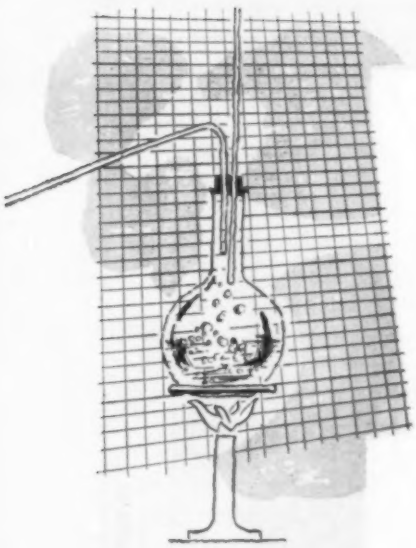
Bolivian deal . . . The Bolivian agreement provides for payment of a nonreimbursable bonus of $1,500,000 plus $2,500,000 as an advance royalty for the Madrejones concession.

In addition, the Fish company would extend credits totaling $13,750,000 which would be repayable in 5 years at interest of 6½ per cent. The agreement provides for $1,500,000 of the credit to be in U. S. dollars with the remaining $12,250,000 to be in equivalent European currency.

The Bolivian Government proposes to allocate $5,750,000 of the total credits to its oil agency, Yacimientos Petroliferos Fiscales Bolivianos. Of this sum, $4,500,000 is earmarked for materials and equipment and the remaining $1,250,000 for a plant to produce high-octane fuel.

the OIL AND GAS JOURNAL's Special Section of Selected

Crude-Evaluation Charts



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WEST TEXAS SOUR

Crude:
Type: Intermediate
Gravity, °API: 32
Sulfur, wt. %: 2.2
Viscosity S.U. at 100° F.: 48
Posted price at field: $2.86

Light Naphtha: (debutanized)
Yield, vol. %: 13
E.p., °F.: 250
Gravity, °API: 65
Sulfur, wt. %: 0.1

Heavy Naphtha:
Yield, vol. %: 13
I.b.p., °F.: 250
E.p., °F.: 375
Gravity, °API: 49
Sulfur, wt. %: 0.3
Char. factor:* 11.7

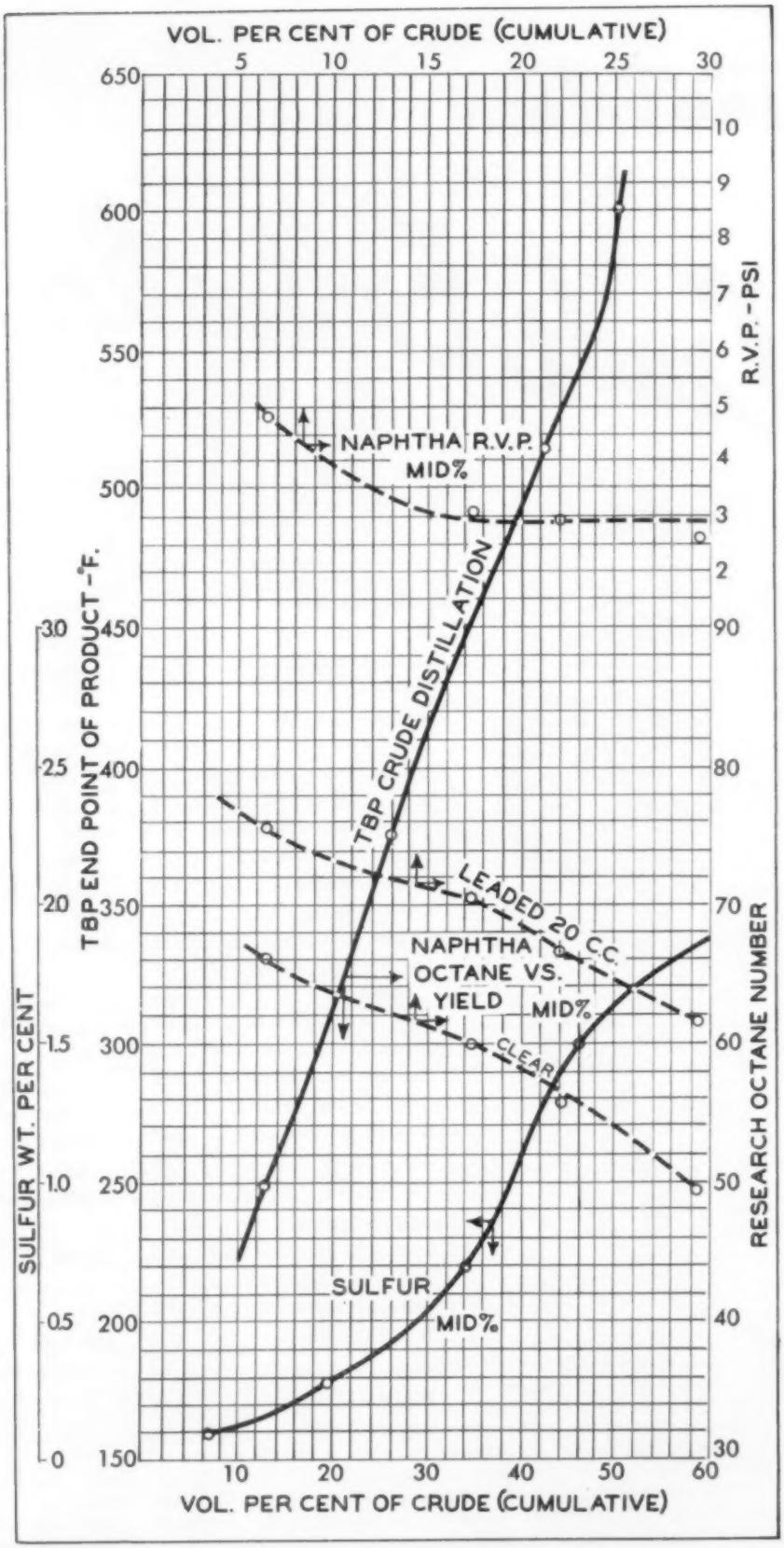
Kerosine:
Yield, vol. %: 16
I.b.p., °F.: 375
E.p., °F.: 530
Gravity, °API: 39
Sulfur, wt. %: 0.7

Diesel Fuel:
Yield, vol. %: 8
I.b.p., °F.: 530
E.p., °F.: 600
Gravity, °API: 33
Sulfur, wt. %: 1.5
Diesel index: 49

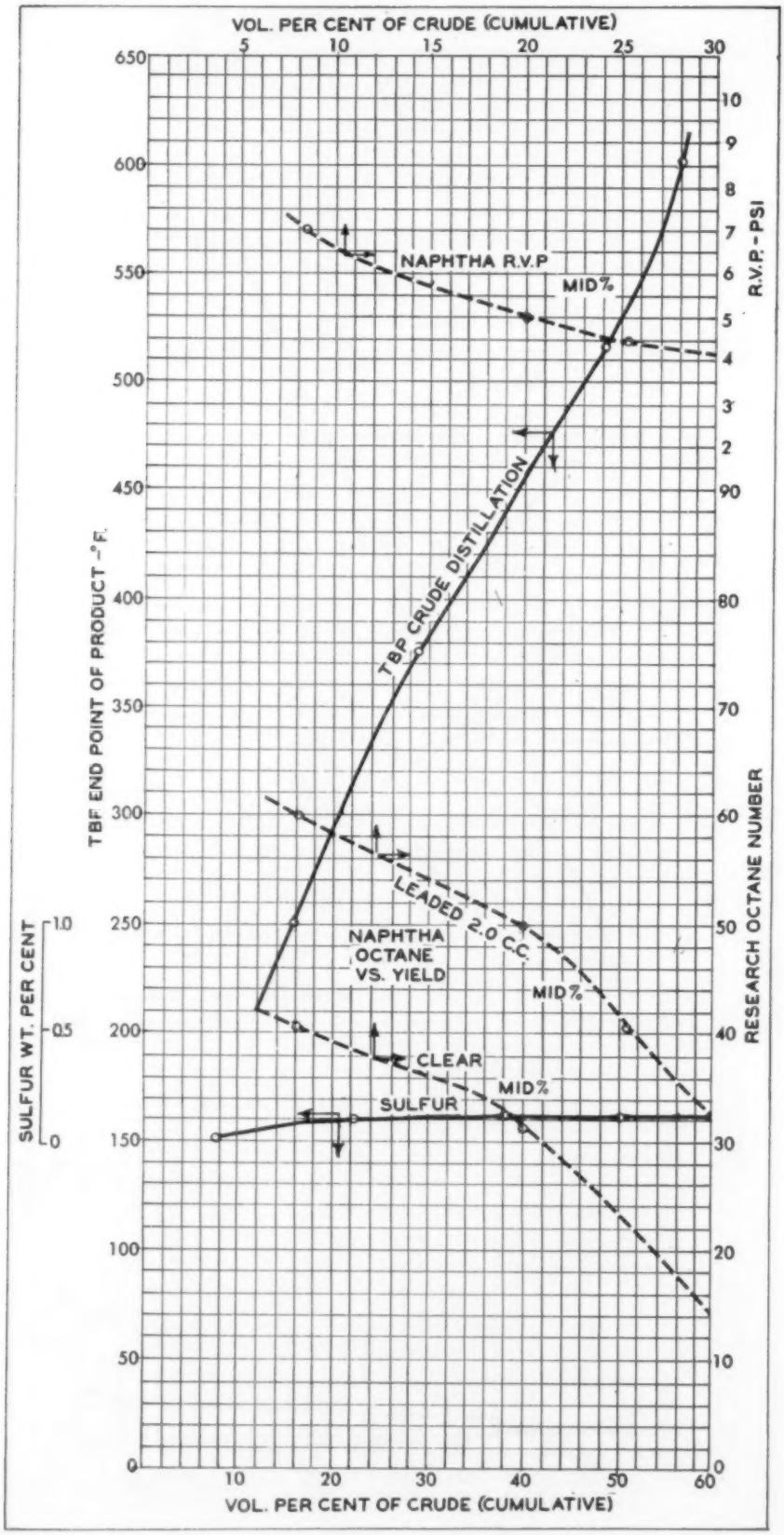
Wide-Range Gas Oil:
Yield, vol. %: 34
I.b.p., °F.: 600
E.p., °F.: 1,000
Sulfur, wt. %: 2.0
Gravity, °API: 23

Heavy Fuel Oil: (1,000°+)
Yield, vol. %: 15
Gravity, °API: 10
Sulfur, wt. %: 3.5
Viscosity, S.F. at 210° F.: 495

*$K = (TB)^{1/3}/S$



WEST TEXAS LIGHT



Crude:
Type: Paraffin, intermediate
Gravity, °API: 42
Sulfur, wt. %: 0.25
Viscosity S.U. at 100° F.: 37
Posted price at field: $3.15

Light Naphtha:
Debutanized
Yield, vol. %: 16
E.p., °F.: 250
Gravity, °API: 74.5
Sulfur, wt. %: 0.06

Heavy Naphtha:
Yield, vol. %: 13
I.b.p., °F.: 250
E.p., °F.: 375
Gravity, °API: 57
Sulfur, wt. %: 0.1
Char. factor: 12.2

Kerosine:
Yield, vol. %: 19
I.b.p., °F.: 375
E.p., °F.: 530
Gravity, °API: 46
Sulfur, wt. %: 0.1

Diesel Fuel:
Yield, vol. %: 8
I.b.p., °F.: 530
E.p., °F.: 600
Gravity, °API: 41
Sulfur, wt. %: 0.1
Diesel index: 74

Wide-Range Gas Oil:
Yield, vol. %: 28
I.b.p., °F.: 600
E.p., °F.: 1,000
Sulfur, wt. %: 0.3
Gravity, °API: 29

Heavy Fuel Oil: (1,000°+)
Yield, vol. %: 12
Gravity, °API: 14
Sulfur, wt. %: 0.5
Viscosity S.F. at 210° F.: 92

GULF COASTAL HEAVY

Crude:
Type: Naphthene intermediate
Gravity, °API: 27
Sulfur, wt. %: 0.25
Viscosity at 100° F.: 61
Posted price at field: $3.52

Light Naphtha:
Debutanized
Yield, vol. %: 5
E.p., °F.: 250
Gravity, °API: 58
Sulfur, wt. %: 0.02

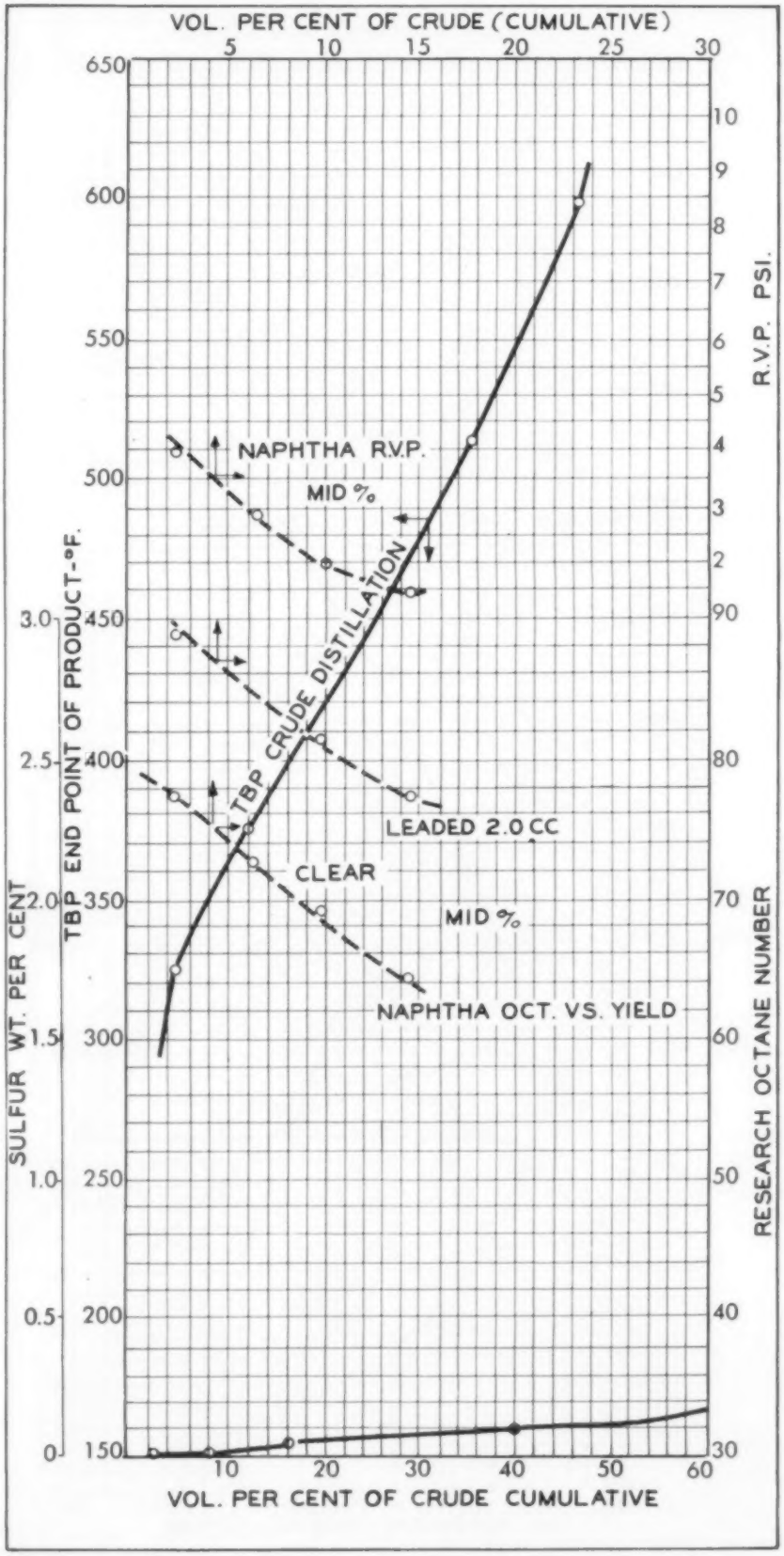
Heavy Naphtha:
Yield, vol. %: 7
I.b.p., °F.: 250
E.p., °F.: 375
Gravity, °API: 45
Sulfur, wt. %: 0.02
Char. factor: 11.4

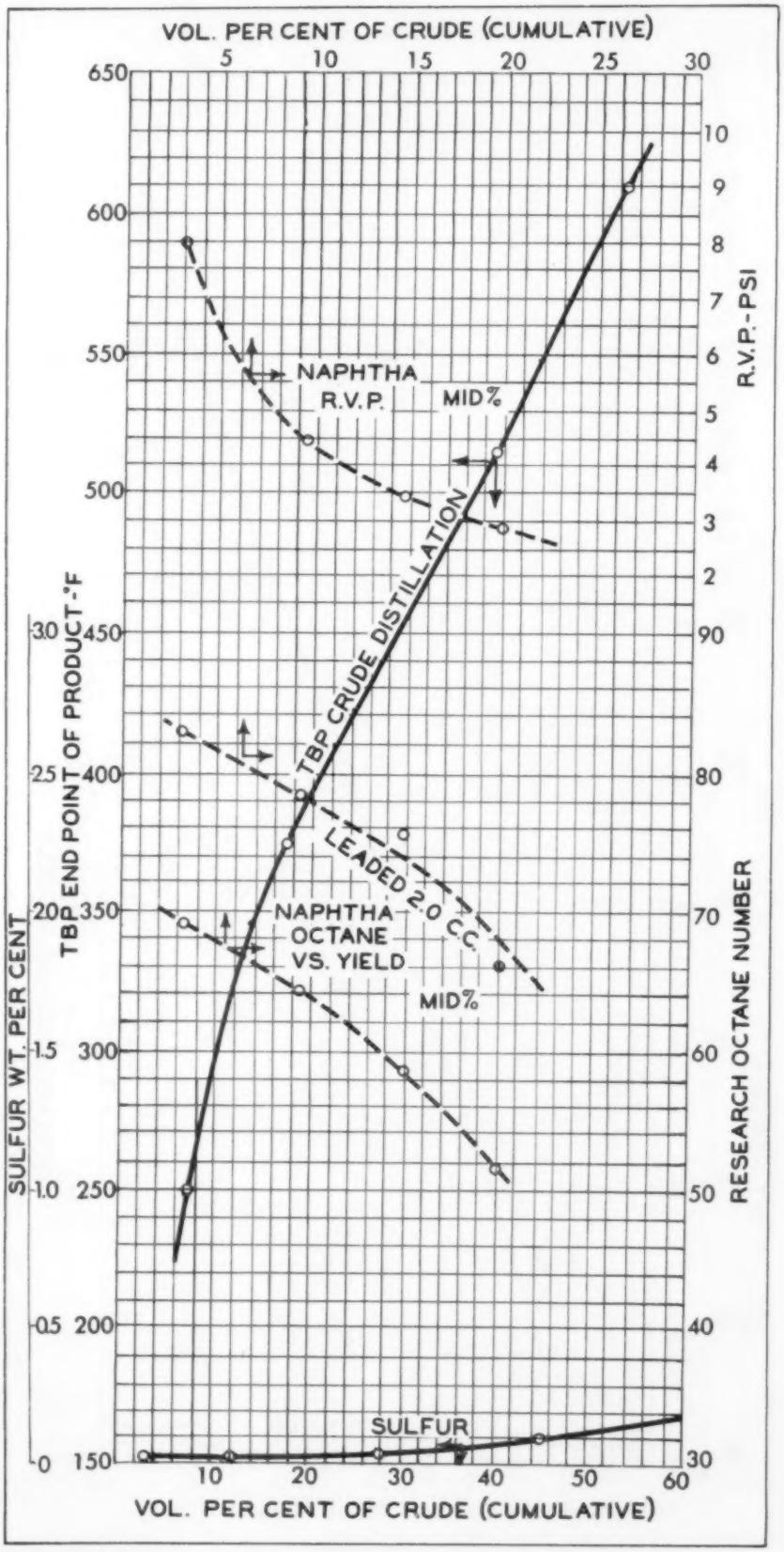
Kerosine:
Yield, vol. %: 23
I.b.p., °F.: 375
E.p., °F.: 530
Gravity, °API: 33
Sulfur, wt. %: 0.06

Diesel Fuel:
Yield, vol. %: 11
I.b.p., °F.: 530
E.p., °F.: 600
Gravity, °API: 29
Sulfur, wt. %: 0.1
Diesel index: 42

Wide-Range Gas Oil:
Yield, vol. %: 41
I.b.p., °F.: 600
E.p., °F.: 1,000
Sulfur, wt. %: 0.2
Gravity, °API: 22

Heavy Fuel Oil: (1,000°+)
Yield, vol. %: 12
Gravity, °API: 15
Sulfur, wt. %: 0.7
Viscosity, S.F. at 210° F: 105





GULF COASTAL SWEET

Crude:
Type: Intermediate
Gravity, °API: 34
Sulfur, wt. %: 0.2
Viscosity at 100° F.: 43
Posted price at field: $3.38

Light Naphtha:
Debutanized
Yield, vol. %: 7
E.p., °F.: 250
Gravity, °API: 63
Sulfur, wt. %: 0.03

Heavy Naphtha:
Yield, vol. %: 10
I.b.p., °F.: 250
E.p., °F.: 375
Gravity, °API: 48
Sulfur, wt. %: 0.03
Char. factor: 11.6

Kerosine:
Yield, vol. %: 22
I.b.p., °F.: 375
E.p., °F.: 530
Gravity, °API: 38
Sulfur, wt. %á 0.05

Diesel Fuel:
Yield, vol. %: 12
I.b.p., °F.: 530
E.p., °F.: 600
Gravity, °API: 35
Sulfur, wt. %: 0.1
Diesel index: 57

Wide-Range Gas Oil:
Yield, vol. %: 42
I.b.p., °F.: 600
E.p., °F.: 1,000
Sulfur, wt. %: 0.2
Gravity, °API: 28

Heavy Fuel Oil: (1,000°+)
Yield, vol. %: 7
Gravity, °API: 16
Sulfur, wt. %: 0.7
Viscosity, S.F. at 210° F.: 76

EAST TEXAS CRUDE

Crude:
Type: Intermediate
Gravity, °API: 39
Sulfur, wt. %: 0.3
Viscosity at 100° F.: 40
Posted price at field: $3.25

Light Naphtha:
Debutanized
Yield, vol. %: 18
E.p., °F.: 250
Gravity, °API: 68
Sulfur, wt. %: 0.01

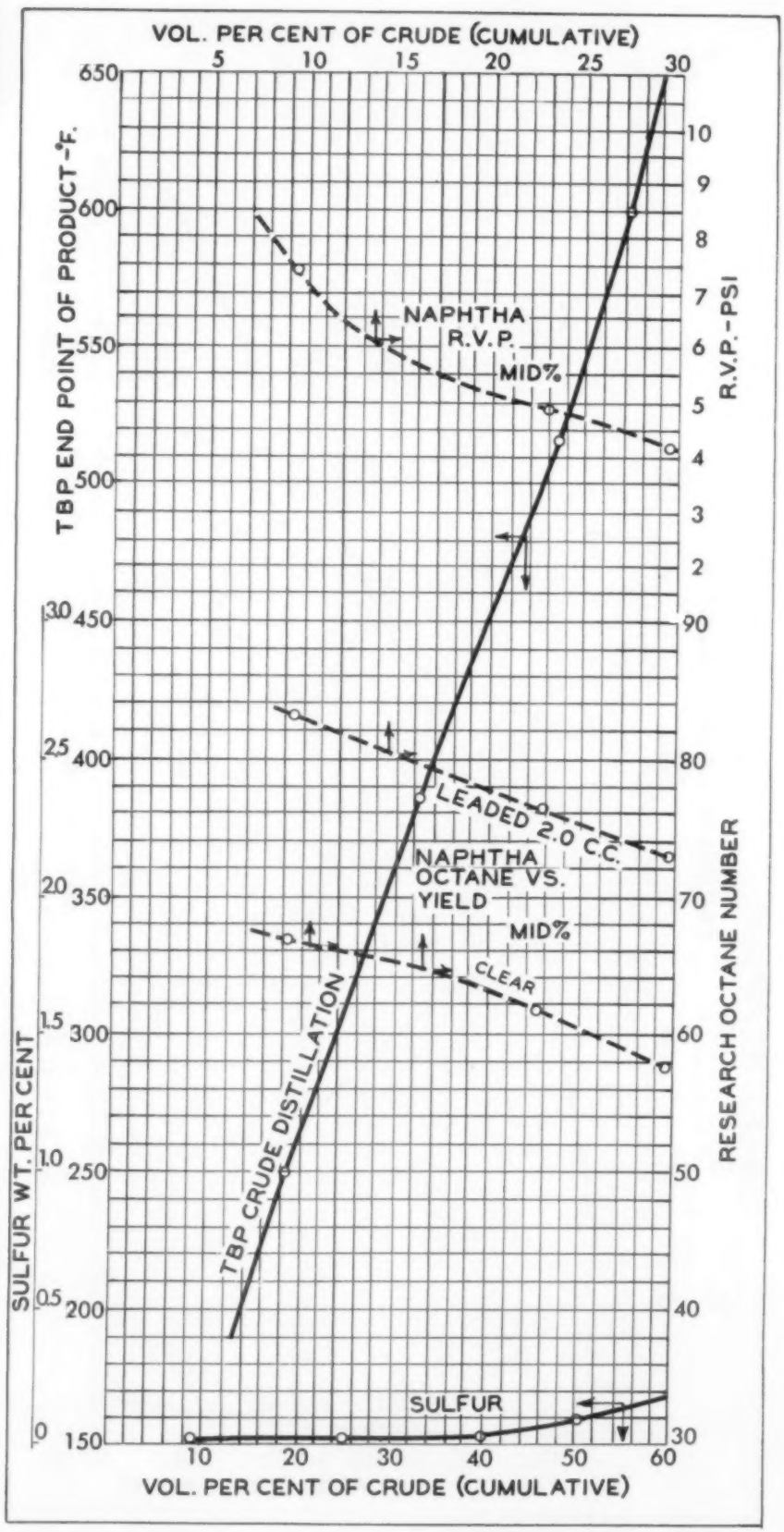
Heavy Naphtha:
Yield, vol. %: 14
I.b.p., °F.: 250
E.p., °F.: 375
Gravity, °API: 50
Sulfur, wt. %: 0.01
Char. factor: 11.8

Kerosine:
Yield, vol. %: 15
I.b.p., °F.: 375
E.p., °F.: 530
Gravity, °API: 40
Sulfur, wt. %: 0.03

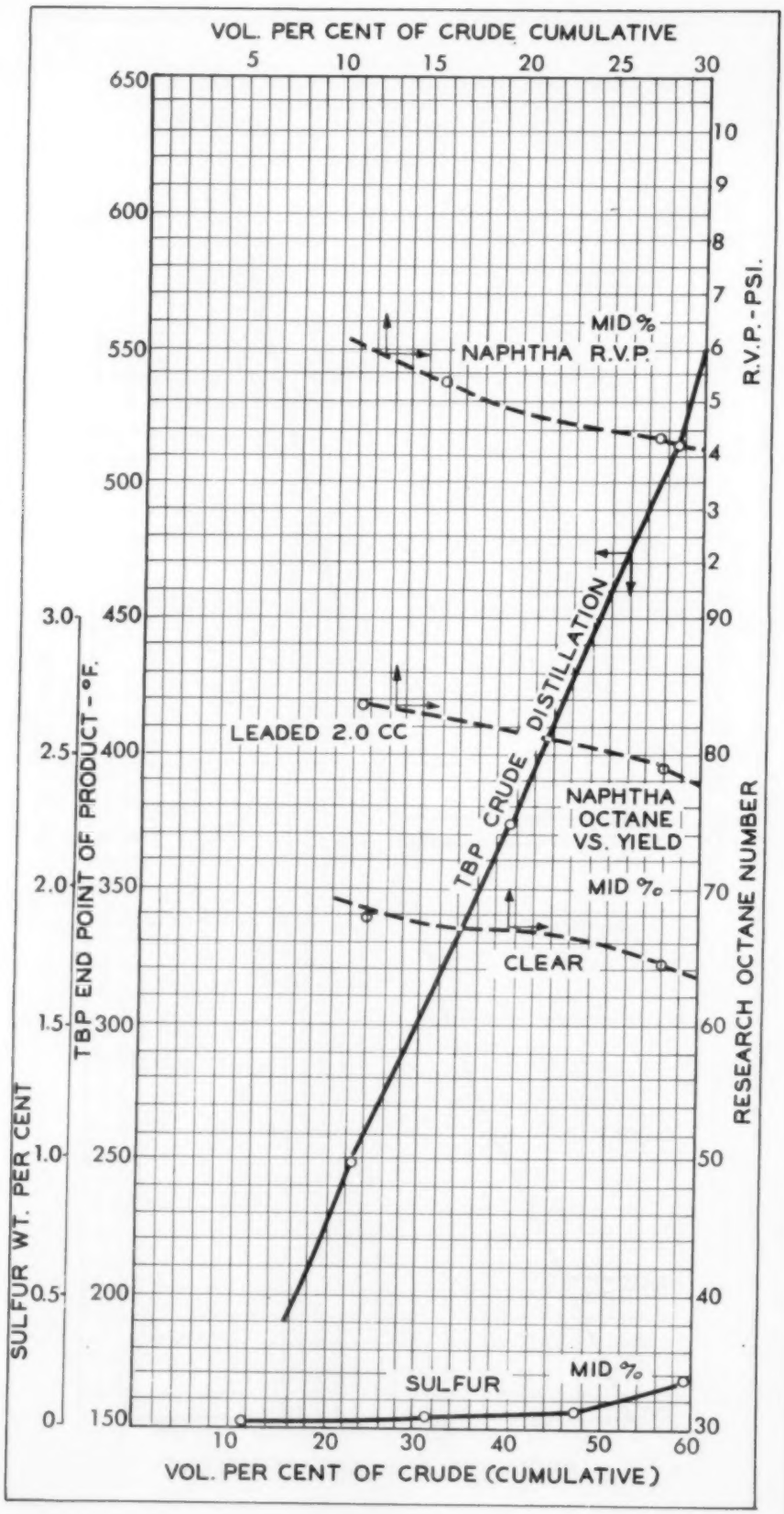
Diesel Fuel:
Yield, vol. %: 7
I.b.p., °F.: 530
E.p., °F.: 600
Gravity, °API: 36
Sulfur, wt. %: 0.1
Diesel index: 61

Wide-Range Gas Oil:
Yield, vol. %: 31
I.b.p., °F.: 600
E.p., °F.: 1,000
Sulfur, wt. %: 0.35
Gravity, °API: 27

Heavy Fuel Oil: (1,000°+)
Yield, vol. %: 11
Gravity, °API: 13
Sulfur, wt. %: 1.2
Viscosity, S.F. at 210° F.: 157



SCURRY COUNTY



Crude:
Type: Intermediate
Gravity, °API: 42
Sulfur, wt. %: 0.24
Viscosity at 100° F.: 34
Posted price at field: $3.15

Light Naphtha:
Debutanized
Yield, vol. %: 23
E.p., °F.: 250
Gravity, °API: 66
Sulfur, wt. %: 0.03

Heavy Naphtha:
Yield, vol. %: 16
I.b.p., °F.: 250
E.p., °F.: 375
Gravity, °API: 50
Sulfur, wt. %: 0.06
Char. factor: 11.8

Kerosine:
Yield, vol. %: 17
I.b.p., °F.: 375
E.p., °F.: 530
Gravity, °API: 39
Sulfur, wt. %: 0.08

Diesel Fuel:
Yield, vol. %: 7
I.b.p., °F.: 530
E.p., °F.: 600
Gravity, °API: 35
Sulfur, wt. %: 0.2
Diesel index: 59

Wide-Range Gas Oil:
Yield, vol. %: 26
I.b.p., °F.: 600
E.p., °F.: 1,000
Sulfur, wt. %: 0.4
Gravity, °API: 28

Heavy Fuel Oil: (1,000°+)
Yield, vol. %: 7
Gravity, °API: 14
Sulfur, wt. %: 0.7
Viscosity, S.F. at 210° F.: 80

MIXED SPRABERRY

Crude:
Type: West Texas-Intermediate Sweet
Gravity, °API: 38.3
Sulfur, wt. %: 0.14
Viscosity, S.U.s. at 60° F.: 52.9
R.v.p., psi.: 6.6

Light Naphtha:
Yield, vol. %: 15.0
E.p., °F.: 266
Gravity, °API: 74.7
Sulfur, wt. %: 0.005
R-0 and R-3 (octane): 75.4, 92.8

Heavy Naphtha:
Yield, vol. %: 20.9
I.b.p., °F.: 226
E.p., °F.: 404
Gravity, °API: 50.7
Sulfur, wt. %: 0.010
Char. factor:* 11.8
Naphthenes, vol. %: 60
Aromatics, vol. %: 9
Paraffins, vol. %: 31
R-0 (octane): 49.0

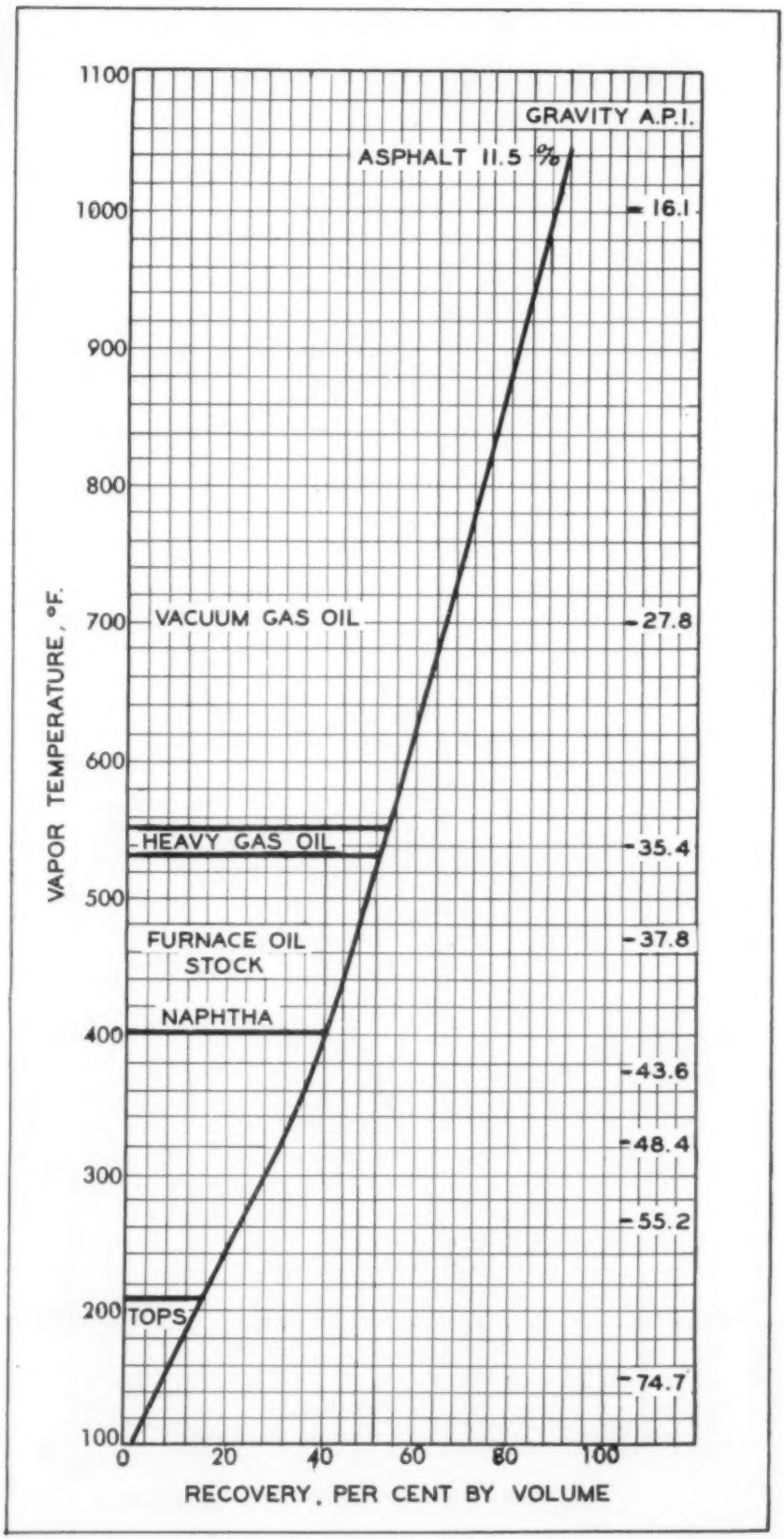
Light Gas Oil:
Yield, vol. %: 17.2
I.b.p., °F.: 356
E.p., °F.: 514
Gravity, °API: 39.9
Sulfur, wt. %: 0.023

Heavy Gas Oil:
Viscosity, S.U.s. at 100° F.: 38.8
Diesel index: 56.6
Sulfur, wt. %: 0.13
Gravity, °API: 35.4

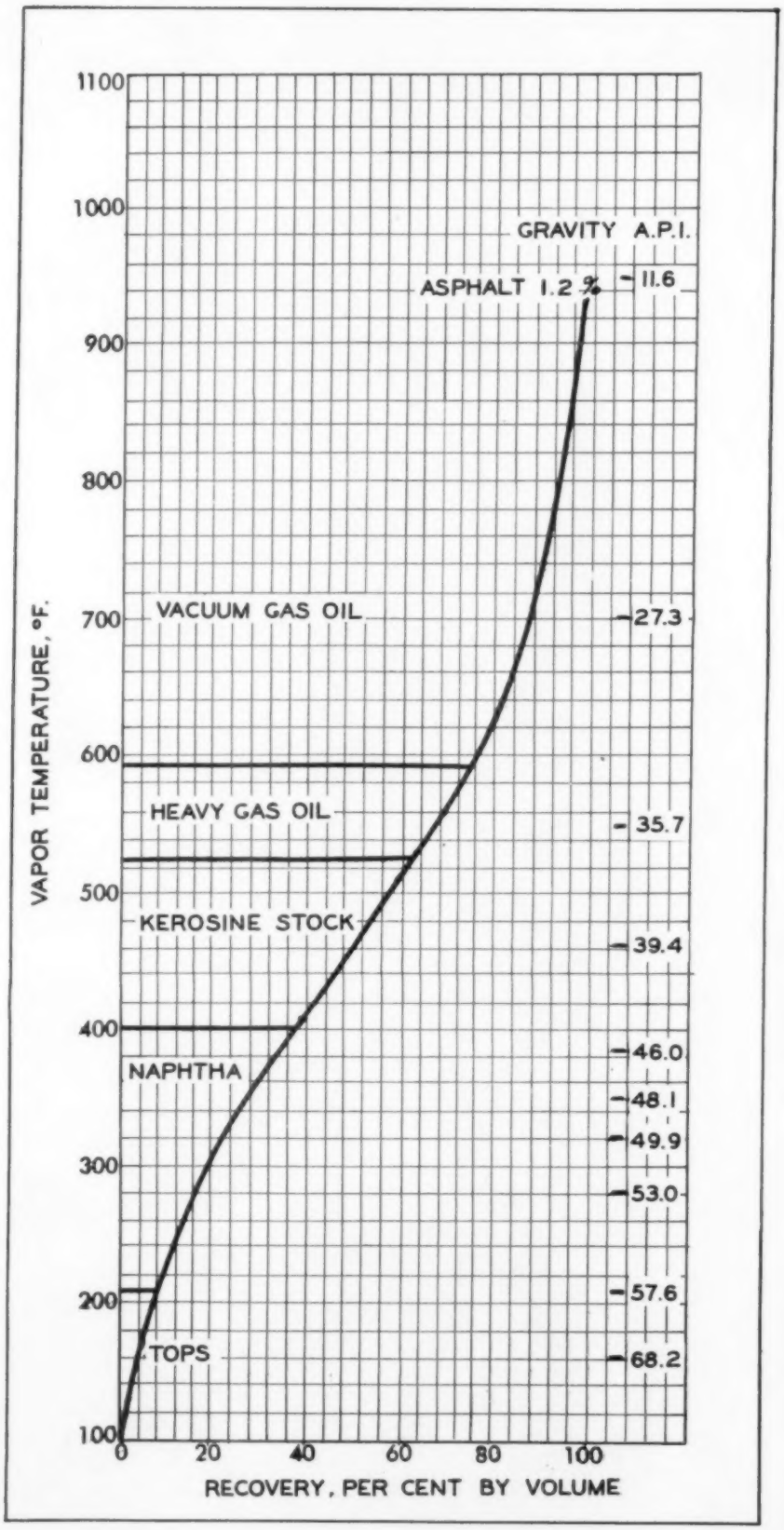
Vacuum Gas Oil:
Yield, vol. %: 32.8
Gravity, °API: 27.8
Sulfur, wt. %: 0.18
RCR, wt. %: 0.13
Viscosity, S.U.s.:
at 100° F.: 399.8†
at 130° F.: 178.9†
at 210° F.: 55.3†

Asphalt: (85-100 penetration)
Yield, vol. %: 11.5
Gravity, °API: 16.1
Penetration at 77° F.: 225+
Sulfur, wt. %: 0.28

*$K = (TB)^{1/3}/S$
†700° to 1,000° F. stock.



SEELIGSON CRUDE



Crude:
Type: South Texas—Sweet
Gravity, °API: 40.5
Sulfur, wt. %: 0.060
Viscosity, S.U.s. at 60° F.: 37.2
R.v.p., psi.: 2.2

Light Naphtha:
Yield, vol. %: 6.7
E.p., °F.: 236
Gravity, °API: 68.2
Sulfur, wt. %: 0.003
R-0 and R-3 (octane): 74.0, 91.6

Heavy Naphtha:
Yield, vol. %: 16.2
I.b.p., °F.: 240
E.p., °F.: 400
Gravity, °API: 50.8
Sulfur, wt. %: 0.008
Char. factor:* 11.8
Naphthenes, vol. %: 39
Aromatics, vol. %: 17
Paraffins, vol. %: 44
R-0 (octane): 45.2

Kerosine:
Yield, vol. %: 35.6
I.b.p., °F.: 336
E.p., °F.: 498
Gravity, °API: 43.0
Sulfur, wt. %: 0.014
Viscosity, Kin. at 100° F.: 1.51

Heavy Gas Oil:
Viscosity, S.U.s. at 100° F.: 37.5
Diesel index: 56.2
Sulfur, wt. %: 0.050
Gravity, °API: 35.7

Vacuum Gas Oil:
Yield, vol. %: 21.9
Gravity, °API: 27.3
Sulfur, wt. %: 0.17
Residue, wt. %: 0.17
Viscosity, S.U.s.:
at 100° F.: 291.2†
at 130° F.: 132.4†
at 210° F.: 48.4†

Asphalt: (85-100 penetration)
Yield, vol. %: 1.2
Gravity, °API: 11.6
Penetration at 77° F.: 225+
Sulfur, wt. %: 0.45

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*$K = (TB)^{1/3}/S$
†700° to 1,000° F. stock

SOUTH TEXAS SWEDEN

Crude:
Type: Intermediate
Gravity, °API: 41
Sulfur, wt. %: 0.06
Viscosity at 100° F.: 33
Posted price at field: $3.35

Light Naphtha:
Debutanized
Yield, vol. %: 14
E.p., °F.: 250
Gravity, °API: 67
Sulfur, wt. %: 0.02

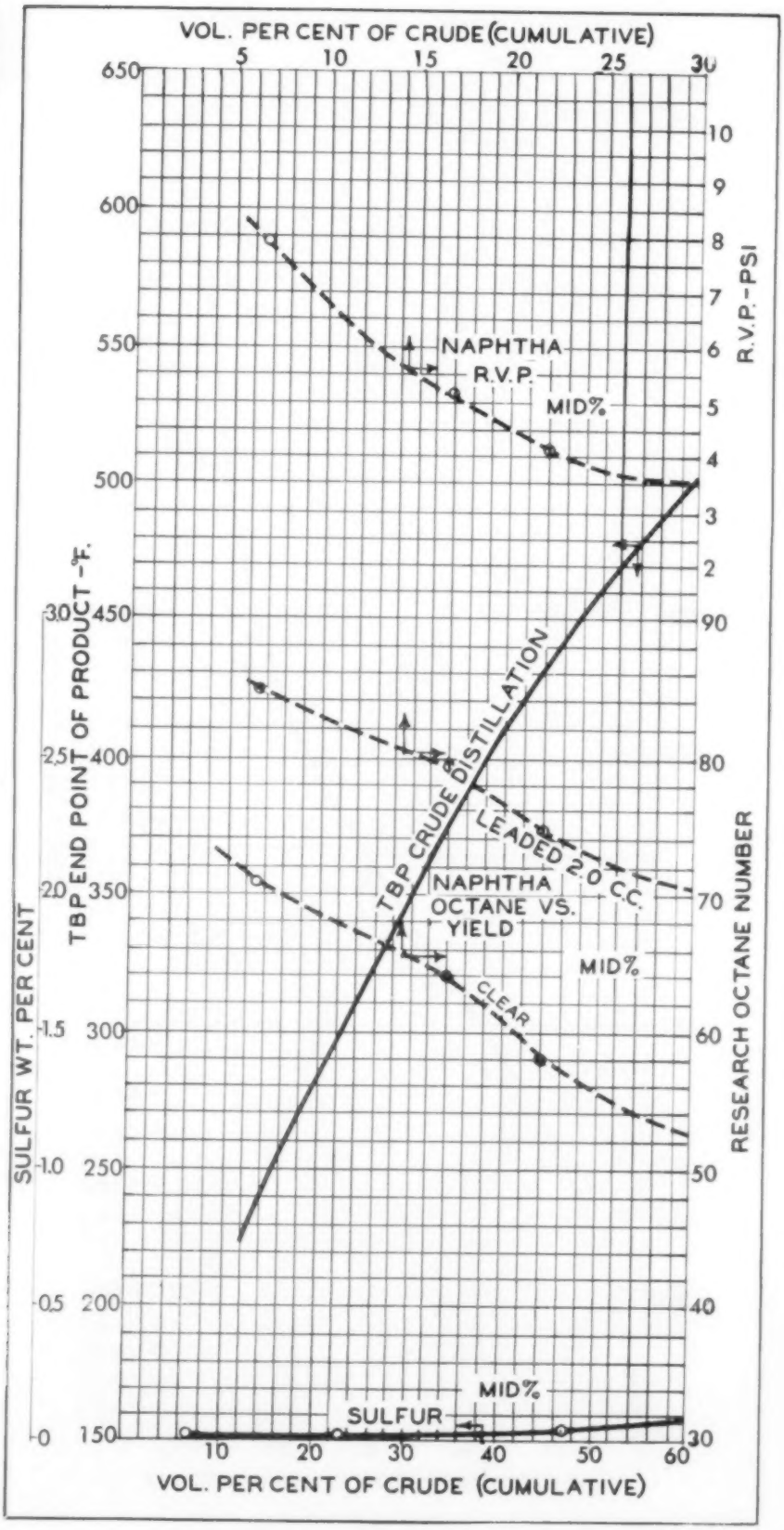
Heavy Naphtha:
Yield, vol. %: 18
I.b.p., °F.: 250
E.p., °F.: 375
Gravity, °API: 49
Sulfur, wt. %: 0.02
Char. factor: 11.7

Kerosine:
Yield, vol. %: 31
I.b.p., °F.: 375
E.p., °F.: 530
Gravity, °API: 38
Sulfur, wt. %: 0.04

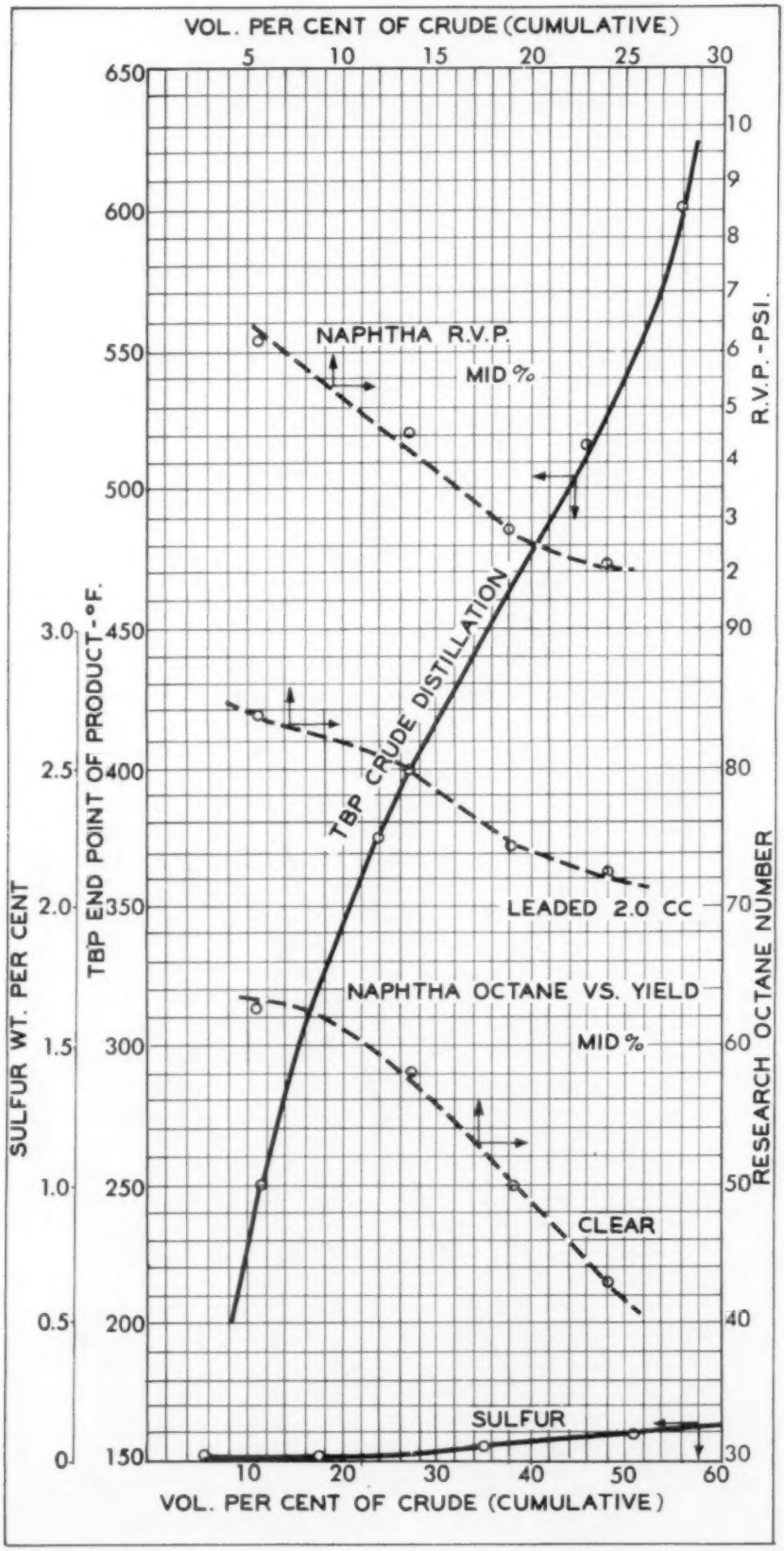
Diesel Fuel:
Yield, vol. %: 13
I.b.p., °F.: 530
E.p., °F.: 600
Gravity, °API: 36
Sulfur, wt. %: 0.09
Diesel index: 60

Wide-Range Gas Oil:
Yield, vol. %: 23
I.b.p., °F.: 600
E.p., °F.: 1,000
Sulfur, wt. %: 0.1
Gravity, °API: 27

Heavy Fuel Oil: (1,000°+)
Yield, vol. %: 1
Gravity, °API: 11
Sulfur, wt. %: 0.9
Viscosity, S.F. at 210° F.: 52



SOUTH LOUISIANA


VOL. PER CENT OF CRUDE (CUMULATIVE)
5 10 15 20 25 30
650 600 550 500 450 400 350 300 250 200 150
10 9 8 7 6 5 4 3 2 90 80 70 60 50 40 30
R.V.P. - PSI.
NAPHTHA R.V.P.
MID %
TBP CRUDE DISTILLATION
LEADED 2.0 CC
NAPHTHA OCTANE VS. YIELD
MID %
CLEAR
SULFUR
SULFUR WT. PER CENT
3.0 2.5 2.0 1.5 1.0 0.5 0
TBP END POINT OF PRODUCT - °F.
RESEARCH OCTANE NUMBER
10 20 30 40 50 60
VOL. PER CENT OF CRUDE (CUMULATIVE)

Crude:
Type: Intermediate
Gravity, °API: 37
Sulfur, wt. %: 0.13
Viscosity at 100° F.: 40
Posted price at field: $3.39

Light Naphtha:
Debutanized
Yield, vol. %: 12
E.p., °F.: 250
Gravity, °API: 67
Sulfur, wt. %: 0.02

Heavy Naphtha:
Yield, vol. %: 12
I.b.p., °F.: 250
E.p., °F.: 375
Gravity, °API: 49
Sulfur, wt. %: 0.02
Char. factor: 11.7

Kerosine:
Yield, vol. %: 22
I.b.p., °F.: 375
E.p., °F.: 530
Gravity, °API: 39
Sulfur, wt. %: 0.05

Diesel Fuel:
Yield, vol. %: 10
I.b.p., °F.: 530
E.p., °F.: 600
Gravity, °API: 36
Sulfur, wt. %: 0.1
Diesel index: 60

Wide-Range Gas Oil:
Yield, vol. %: 36
I.b.p., °F.: 600
E.p., °F.: 1,000
Sulfur, wt. %: 0.15
Gravity, °API: 28

Heavy Fuel Oil: (1,000°+)
Yield, vol. %: 6
Gravity, °API: 14
Sulfur, wt. %: 0.7
Viscosity, S.F. at 210° F.: 137

OKLAHOMA AVERAGE

Crude:
Type: Paraffin
Gravity, °API: 39.9
R.v.p., psi.: 6.1
Sulfur, wt. %: 0.20
Pour pt., °F.: +5
Viscosity, S.U.s. at 70° F.: 44.4
Posted price: $3.15

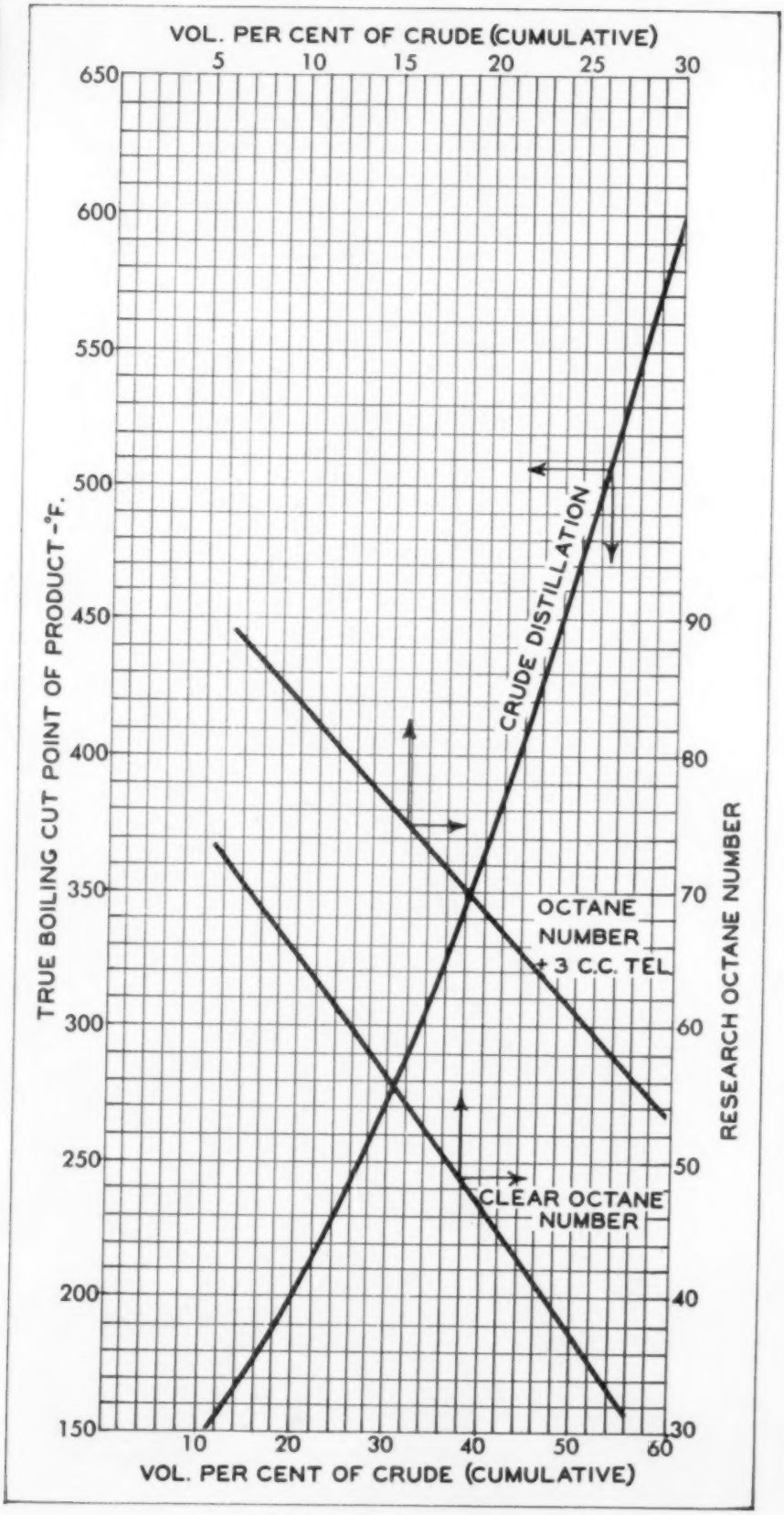
Light Naphtha:
Debutanized
Yield, vol. %: 19.3
E.p., °F.: 260
Gravity, °API: 70.7
Sulfur, wt. %: 0.008
R.v.p., psi.: 6.6

Heavy Naphtha:
Yield, vol. %: 15.8
I.b.p., °F.: 270
E.p., °F.: 404
Gravity, °API: 50.8
Sulfur, wt. %: 0.014
Naphthenes, vol. %: 40.0
Aromatics, vol. %: 10.0
Paraffins, vol. %: 50.0

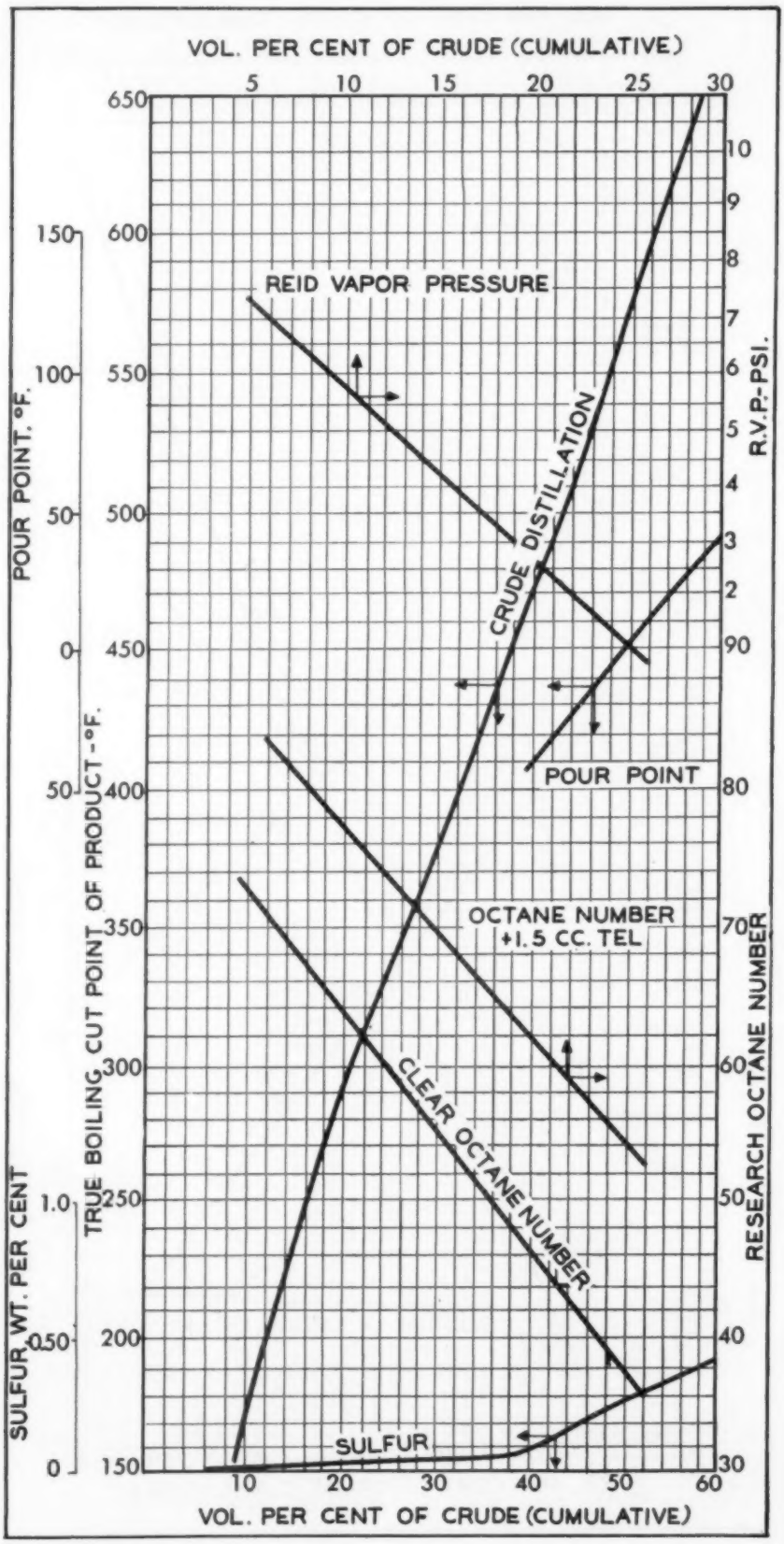
Diesel Fuel:
Yield, vol. %: 9.8
I.b.p., °F.: 415
E.p., °F.: 524
Gravity, °API: 42.0
Sulfur, wt. %: 0.018
Cetane No.: 53.1
Diesel index: 64
Viscosity, S.U.s. at 100° F.: 32.4

Wide-Range Gas Oil:
I.b.p., °F.: 490
E.p., °F.: 945
Sulfur, wt. %: 0.30
Gravity, °API: 31.5

Bottoms:
Yield, vol. %: 7.5
Gravity, °API: 15.0
Sulfur, wt. %: 0.55
Con. carbon, %: 11.3
Viscosity (Furol at 210° F.): 204
Availability (prod., B/D): 65,000



ILLINOIS (LOUDEN)


VOL. PER CENT OF CRUDE (CUMULATIVE)
5 10 15 20 25 30
650 600 550 500 450 400 350 300 250 200 150
10 9 8 7 6 5 4 3 2 90 80 70 60 50 40 30
150 100 50 0 50
POUR POINT, °F.
TRUE BOILING CUT POINT OF PRODUCT - °F.
R.V.P.-PSI.
RESEARCH OCTANE NUMBER
SULFUR WT. PER CENT
1.0 0.50 0
REID VAPOR PRESSURE
CRUDE DISTILLATION
POUR POINT
OCTANE NUMBER +1.5 CC. TEL
CLEAR OCTANE NUMBER
SULFUR
10 20 30 40 50 60
VOL. PER CENT OF CRUDE (CUMULATIVE)

Crude:
Type: Paraffin
Gravity, °API: 37.0
Sulfur, wt. %: 0.34
Viscosity, S.U.s. at 100° F.: 44
Posted price: $3.00

Light Naphtha:
Debutanized
Yield, vol. %: 13.5
E.p., °F.: 257
Gravity, °API: 68.2

Heavy Naphtha:
Yield, vol. %: 13.2
I.b.p., °F.: 250
E.p., °F.: 368
Gravity, °API: 52.1
Sulfur, wt. %: 0.03
Aromatics, vol. %: 16

Diesel Fuel:
Yield, vol. %: 16.0
I.b.p., °F.: 375
E.p., °F.: 530
Gravity, °API: 41.1
Sulfur, wt. %: 0.06
Diesel index: 64
Viscosity: 445 (R.O.)

Wide-Range Gas Oil:
I.b.p., °F.: 530
E.p., °F.: 1,198
Sulfur, wt. %: 0.35
Gravity, °API: 26.9

Heavy Fuel Oil:
Yield, vol. %: 14.3
Gravity, °API: 11.5
Sulfur, wt. %: 0.68
Viscosity (Furol at 275° F.): 120

Availability (prod., B/D): 30,000

DENVER JULESBURG

Crude:
Type: Paraffin
Gravity, °API: 40.8
Sulfur, wt. %: 0.10
Viscosity: S.U.s. (60° F.): 70
Posted price: $3.08

Light Naphtha:
Debutanized
Yield, vol. %: 11.0
E.p., °F.: 200
Gravity, °API: 82.7
Sulfur, wt. %: 0.002

Heavy Naphtha:
Yield, vol. %: 22.0
I.b.p., °F.: 206
E.p., °F.: 375
Gravity, °API: 53.5
Sulfur, wt. %: 0.004
Char. factor.: 11.90
Naphthenes, vol. %: 45.0
Aromatics, vol. %: 11.5
Paraffins, vol. %: 43.5

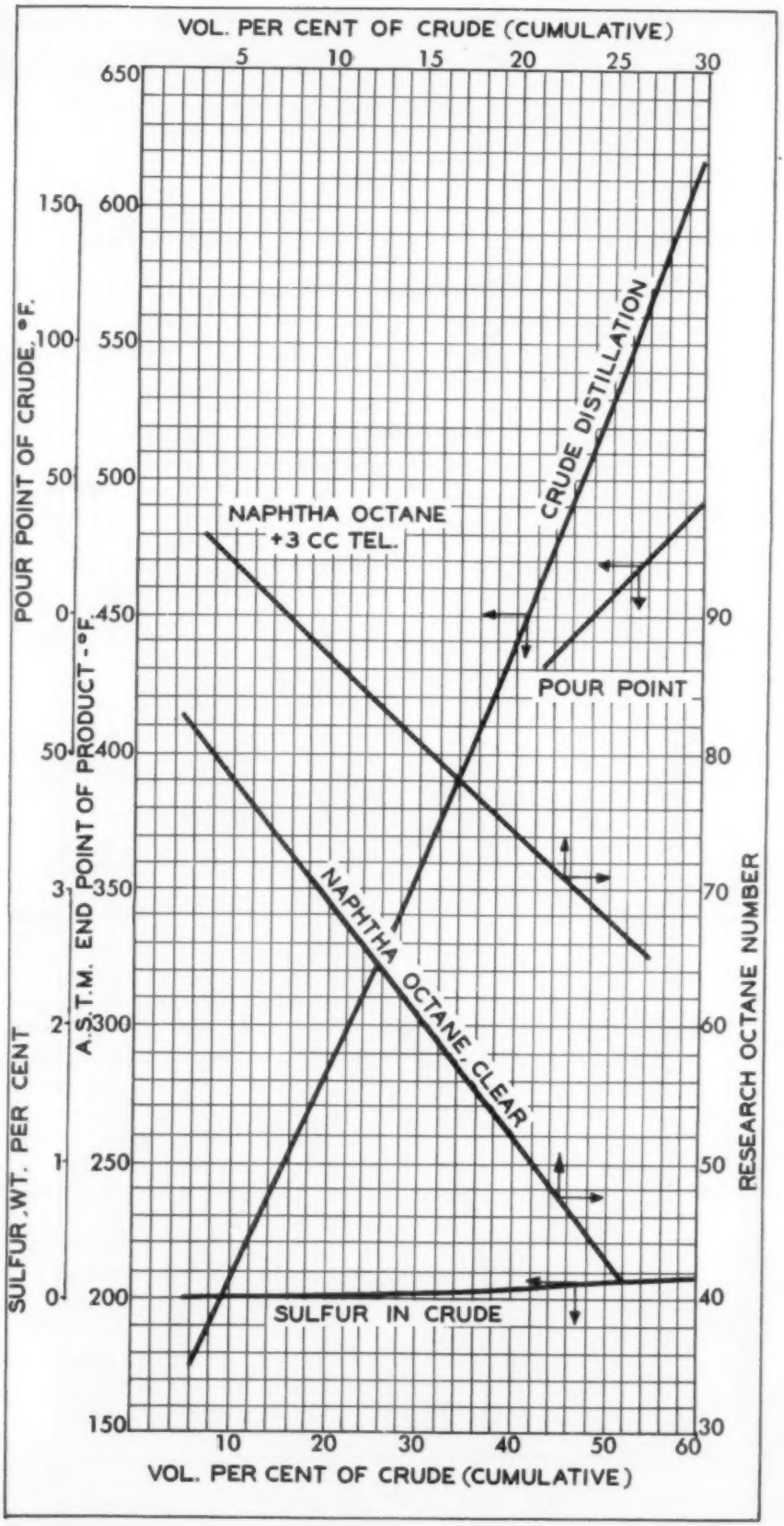
Diesel Fuel:
Yield, vol. %: 26.0
I.b.p., °F.: 422
E.p., °F.: 613
Sulfur, wt. %: 0.10
Cetane No.: 57.2
Diesel index: 65.4
Viscosity: S.U.s. (100° F.): 34.2

Wide-Range Gas Oil:
Yield, vol. %: 36.6
I.b.p., °F.: 584
50% pt., °F.: 725
Sulfur, wt. %: 0.21
Gravity, °API: 28.9

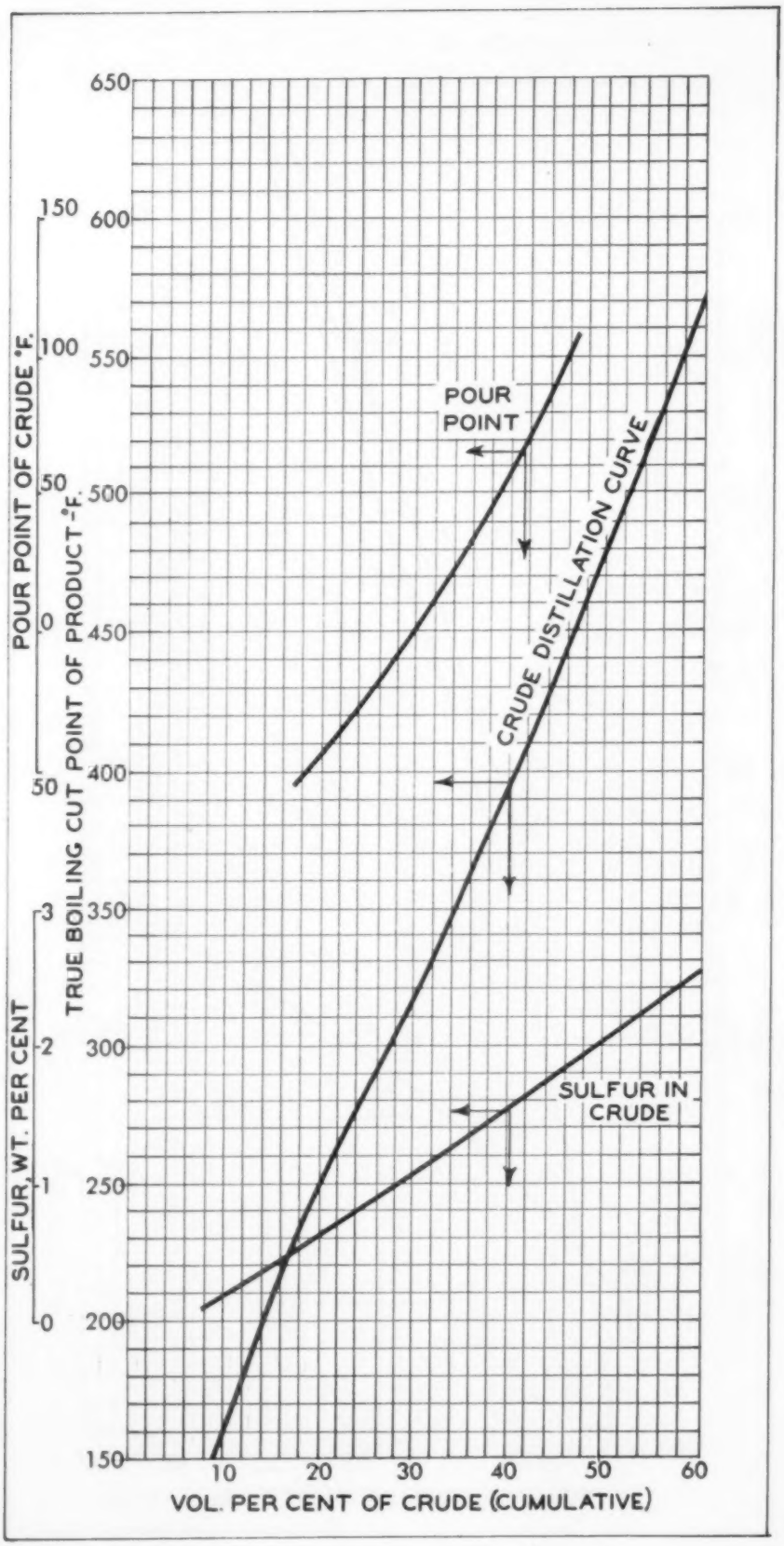
Asphalt: (200 penetration)
Yield, vol. %: 3.7
Gravity, °API: 9.0
Penetration at 77° F.: 205

Availability (prod., B/D): 100,000

°K = $(TB)^{1/3}/S$



WYOMING INTER. SOUR



Crude:
Type: Sour
Gravity, °API: 35.0
Sulfur, wt. %: 1.76
Viscosity: 48.1 at 60°
Posted price: 2.82
F.o.b. Lemont: 3.24

Heavy Naphtha: 225°-400°
Yield, vol. %: 14.1
I.b.p., °F.: 260
E.p., °F.: 392
Gravity, °API: 52.0
Sulfur, wt. %: 0.11
Naphthenes, vol. %: 33
Aromatics, vol. %: 13
Paraffins, vol. %: 54

Light Dist.:
Yield, vol. %: 25.4
I.b.p., °F.: 368
E.p., °F.: 530
Sulfur, wt. %: 0.75

Gas Oil: Vac.
I.b.p., °F.: 569
E.p., °F.: 985
Sulfur, wt. %: 2.90
Gravity, °API: 30.5

Heavy Gas Oil: (650° +)
Yield, vol. %: 1.8
Gravity, °API: 31.7
Sulfur, wt. %: 1.69
Viscosity: 41.7 at 100°

Asphalt: (85-100 Penetration)
Yield, vol. %: 9.2
Gravity, °API: 4.2
Penetration at 77° F.: 119

WYOMING ASPHALT SOUR

Crude:
Type: Sour
Gravity, °API: 24.4
Sulfur, wt. %: 2.59
Viscosity: 355 at 60° sec.
Posted price: 2.21
F.o.b. Detroit: 2.75

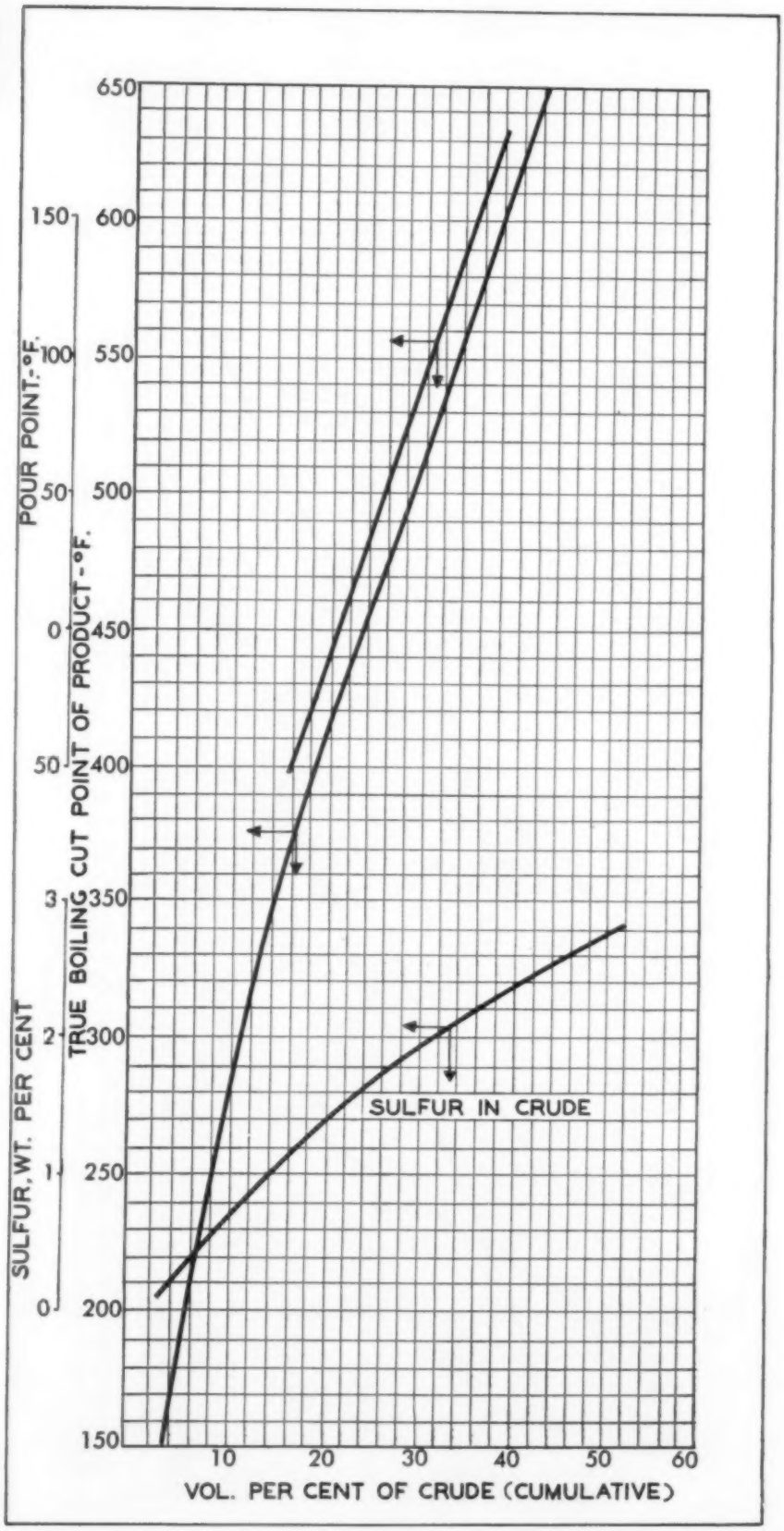
Heavy Naphtha: 225°-400°
Yield, vol. %: 6.2
I.b.p., °F.: 256
E.P., °F.: 376
Gravity, °API: 54.1
Sulfur, wt. %: 0.09
Naphthenes, vol. %: 39
Aromatics, vol. %: 8
Paraffins, vol. %: 53

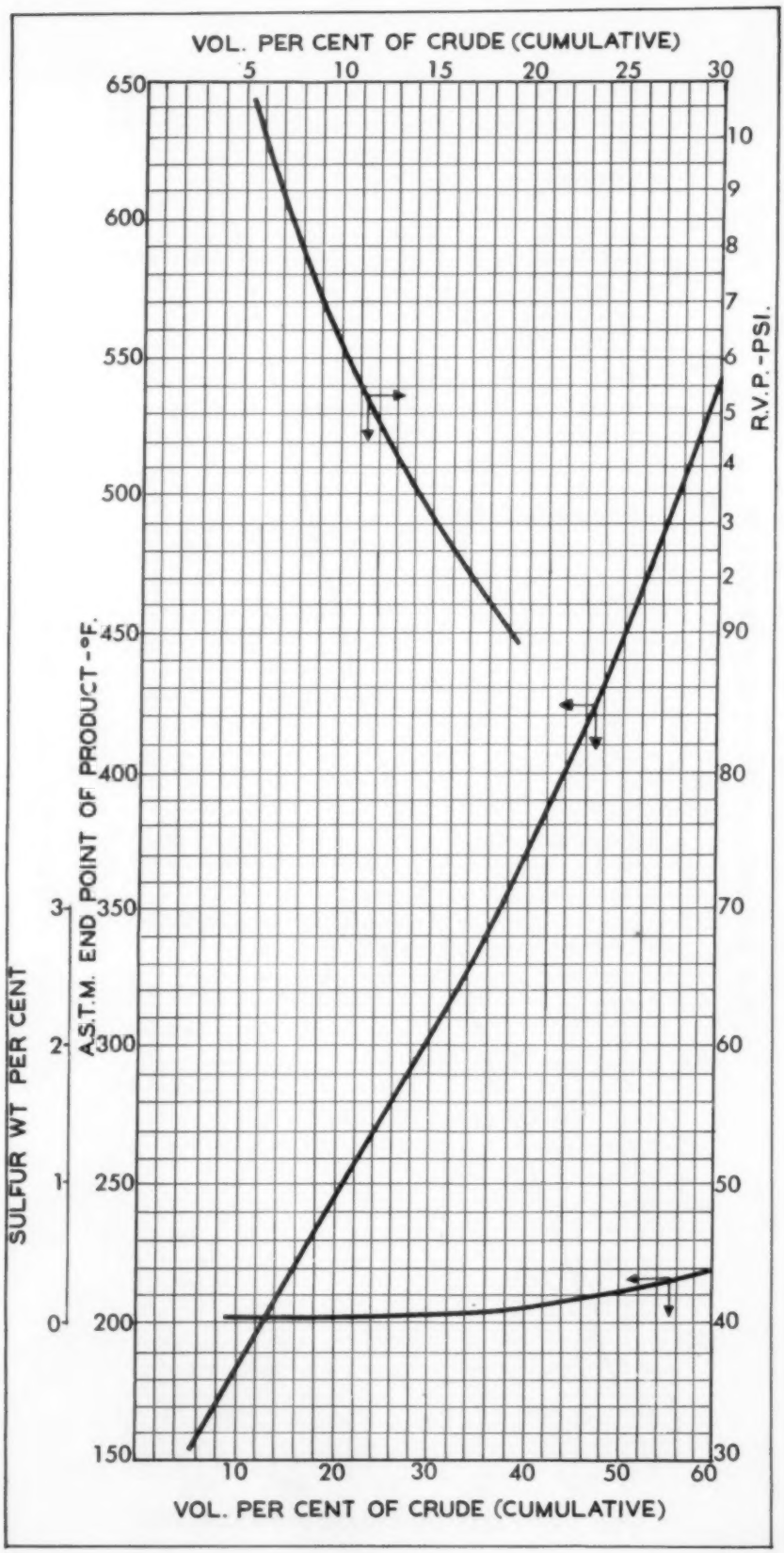
Light Dist.:
Yield, vol. %: 17.6
I.b.p., °F.: 352
E.p., °F.: 552
Sulfur, wt. %: 1.01

Gas Oil: Vac.
I.b.p., °F.: 550
E.p., °F.: 986
Sulfur, wt. %: 2.67
Gravity, °API: 24.0

Heavy Fuel Oil: (650° +)
Yield, vol. %: 1.8
Gravity, °API: 36.0
Sulfur, wt. %: 1.48
Viscosity: 43 at 100° sec.

Asphalt: (85-100 Penetration)
Yield, vol. %: 26.4
Gravity, °API: 2.8
Penetration at 77° F.: 14





NORTH DAKOTA AVERAGE

Crude:
Type (base): Intermediate
Gravity, API: 41.8
Sulfur, wt. %: 0.36
Viscosity S.U.s. at 77° F.: 35.8
Posted price (40° API): $2-$3.15 range
F.o.b.: Wellhead
Pour point, °F.: —30

Light Naphtha:
Debutanized
Yield, vol. %: 26.0
E.p., °F.: 279
Gravity, °API: 66.9
Sulfur, wt. %: 0.02

Heavy Naphtha:
Yield, vol. %: 18.4
I.b.p., °F.: 290
E.p., °F.: 403
Gravity, °API: 48.5
Sulfur, wt. %: 0.04
Char. factor:* 11.69
Naphthenes, vol. %: 41
Aromatics, vol. %: 18
Paraffins, vol. %: 40

Diesel Fuel:
Yield, vol. %: 23.6
I.b.p., °F.: 444
E.p., °F.: 624
Sulfur, wt. %: 0.29
Diesel index: 56

Wide-Range Gas Oil:
I.b.p., °F.: 444
E.p., °F.: 720
Sulfur, wt. %: 0.42
Gravity, °API: 34.0
Pour point, °F.: —10

Heavy Fuel Oil: (650°+)
Yield, vol. %: 31.5
Gravity, °API: 24.8
Sulfur, wt. %: 0.80

Asphalt: (85-100 penetration)

Availability (prod., B/D): 43,000
Companies: Various

*$K = (TB)^{1/3}/S$

ANETH CRUDE

Crude:
Gravity, °API: 40.9
Sulfur, wt. %: 0.12
Viscosity, S.U.s. at 60° F.: 45.5
Pour point, °F.: +40

Light Naphtha:
Debutanized
Yield, vol. %: 17.5
E.p., °F.: 225
Gravity, °API: 74.6
Sulfur, wt. %: 0.013
RON clear: 71.5
RON +3cc.: 87.5

Heavy Naphtha:
Yield, vol. %: 12.7
I.b.p., °F.: 252
E.p., °F.: 370
Gravity, °API: 52.2
Sulfur, wt. %: 0.016
RON, clear: 71.5
Naphthenes, vol. %: 38
Aromatics, vol. %: 17
Paraffins, vol. %: 45

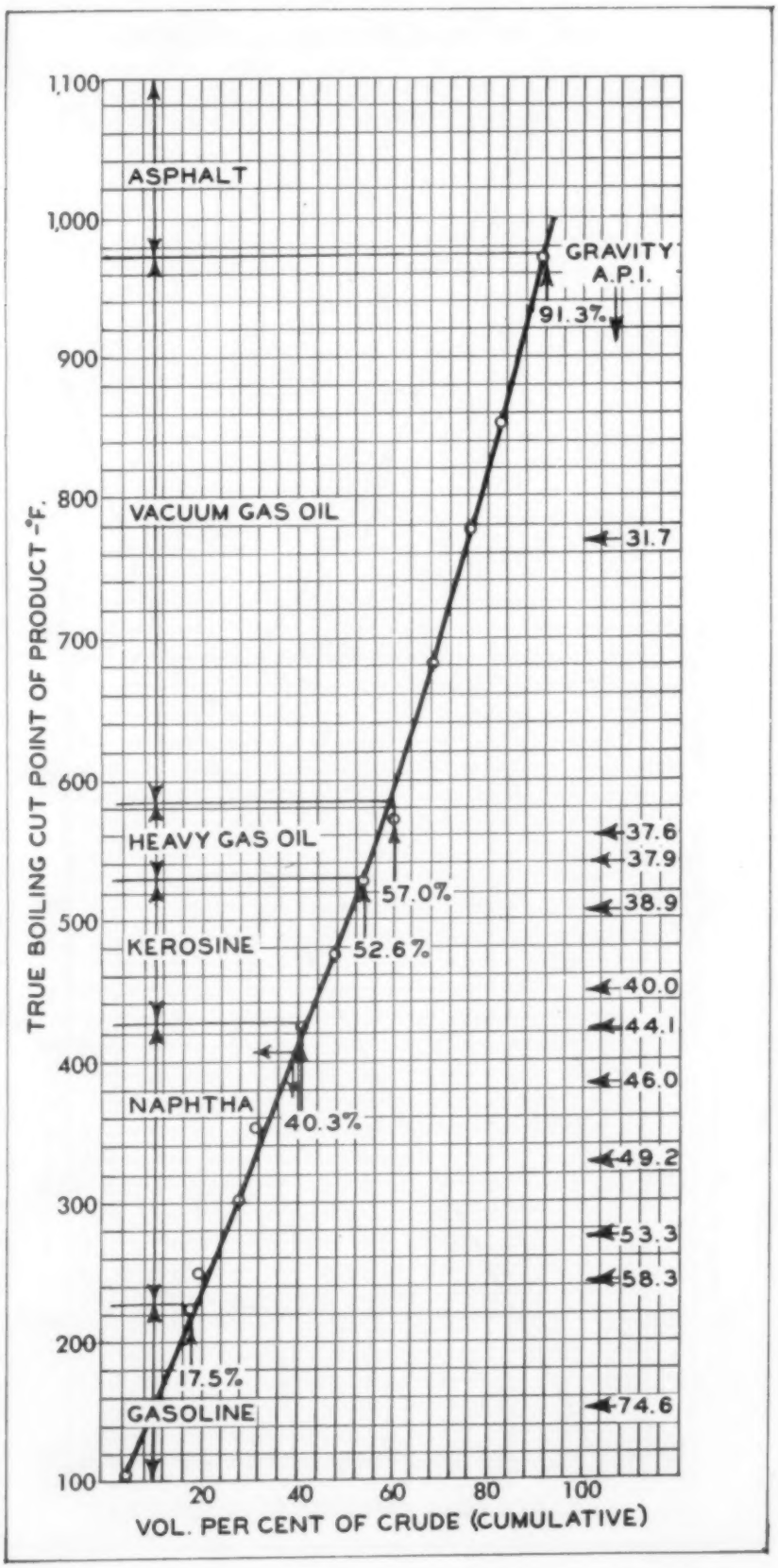
Maximum Kerosine:
Yield, vol. %: 20.6
I.b.p., °F.: 338
E.p., °F.: 516
Gravity, °API: 42.5
Sulfur, wt. %: 0.021
Flash, TCC, °F.: 130
Smoke pt., mm.: 23
Freeze pt., °F.: —38

Heavy Gas Oil:
Yield, vol. %: 4.4
Pour pt., °F.: +10
Sulfur, wt. %: 0.02
Gravity, °API: 37.8
Diesel index: 63.4

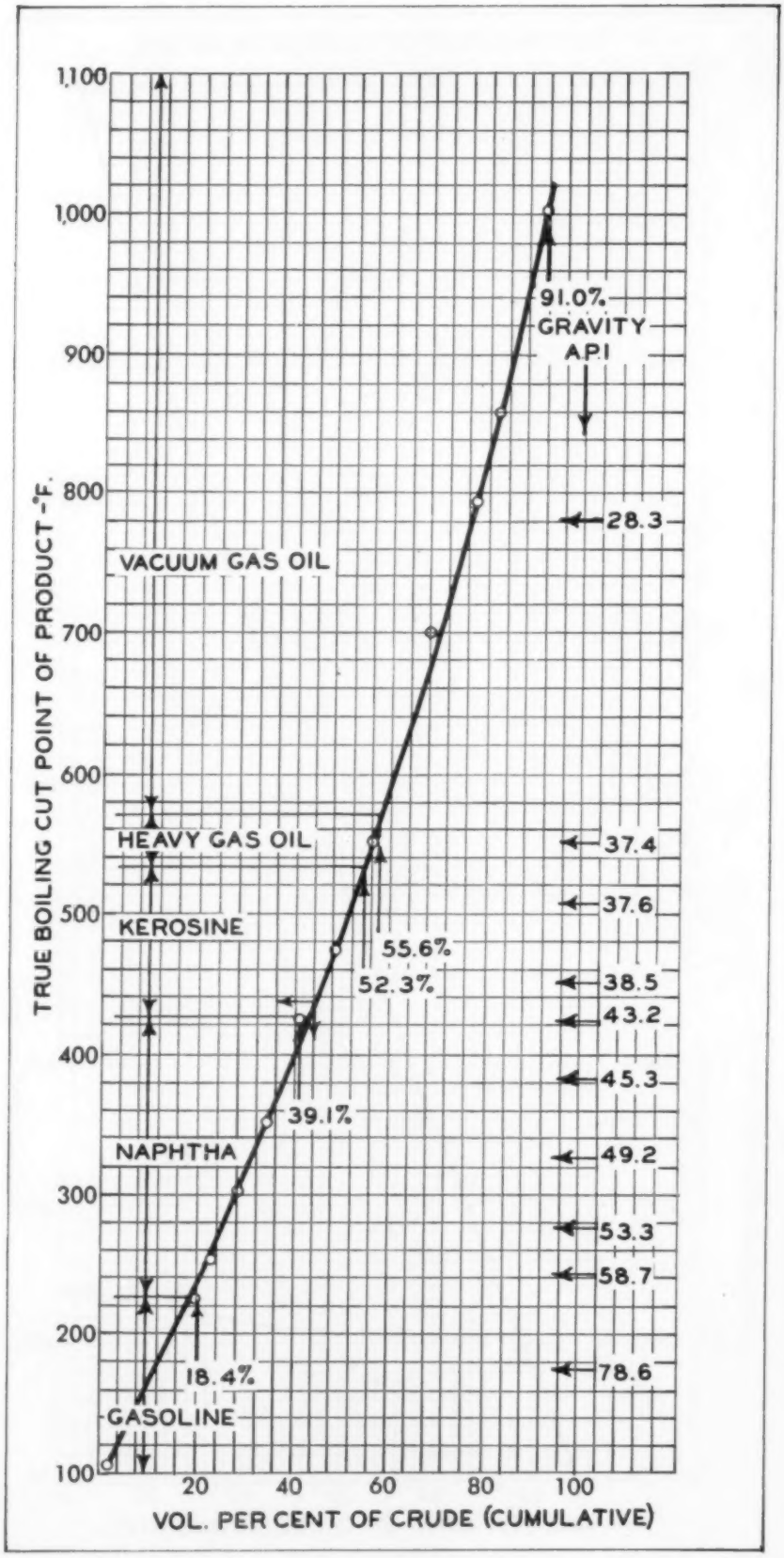
Vacuum Gas Oil:
Yield, vol. %: 34.3
Gravity, °API: 31.7
Sulfur, wt. %: 0.21
Pour pt., °F.: +95

Asphalt:
Yield, vol. %: 8.6
Gravity, °API: 17.1
Penetration at 77° F.: 300+
Sulfur, wt. %: 0.50

Availability (Prod., B/D): 3,300
Company: Four Corners Pipeline



BISTI CRUDE



Crude:
Gravity, °API: 39.0
Sulfur, wt. %: 0.17
Viscosity, S.U.s. at 60° F.: 69.6

Light Naphtha:
Debutanized
Yield, vol. %: 18.4
E.p., °F.: 230
Gravity, °API: 78.6
Sulfur, wt. %: 0.009
RON clear: 71.0
RON +3cc: 91.5

Heavy Naphtha:
Yield, vol. %: 9.9
I.b.p., °F.: 252
E.p., °F.: 340
Gravity, °API: 52.3
Sulfur, wt. %: 0.016
RON clear: 47.0
Naphthenes, vol. %: 46
Aromatics, vol. %: 12
Paraffins, vol. %: 42

Maximum Kerosine:
Yield, vol. %: 21.0
I.b.p., °F.: 328
E.p., °F.: 520
Gravity, °API: 41.4
Sulfur, wt. %: 0.025
Flash, TCC, °F.: 127
Smoke point, mm.: 21
Freeze point, °F.: —28

Heavy Gas Oil:
Yield, vol. %: 3.3
Pour pt., °F.: +20
Diesel index: 64.3
Sulfur, wt. %: 0.04
Gravity, °API: 37.5

Vacuum Gas Oil:
Yield, vol. %: 35.4
Gravity, °API: 28.3
Sulfur, wt. %: 0.19
Pour pt., °F.: +90

Asphalt: (85-100 penetration)
Yield, vol. %: 8.9
Gravity, °API: 13.3
Penetration at 77° F.: 300+

Availability (prod., B/D): 3,900
Company: Four Corners Pipeline

SAN JOAQUIN VALLEY

Crude:
Type: Cuyama field
Gravity, °API: 34.4
Sulfur, wt. %: 0.34
Viscosity S.U. at 50° F.: 104; at 100° F.: 43
Posted price: $3.37
F.o.b.: Field

Light Naphtha (debutanized):
Yield, vol. %: 10.0
E.p., °F.: 200
Gravity, °API: 74.2
Sulfur, wt. %: 0.01

Heavy Naphtha:
Yield, vol. %: 17.0
I.b.p., °F.: 217
E.p., °F.: 340
Gravity, °API: 52.7
Sulfur, wt. %: 0.03
Char. factor:* 12.1
Naphthenes, vol. %: 57
Aromatics, vol. %: 10
Paraffins, vol. %: 33

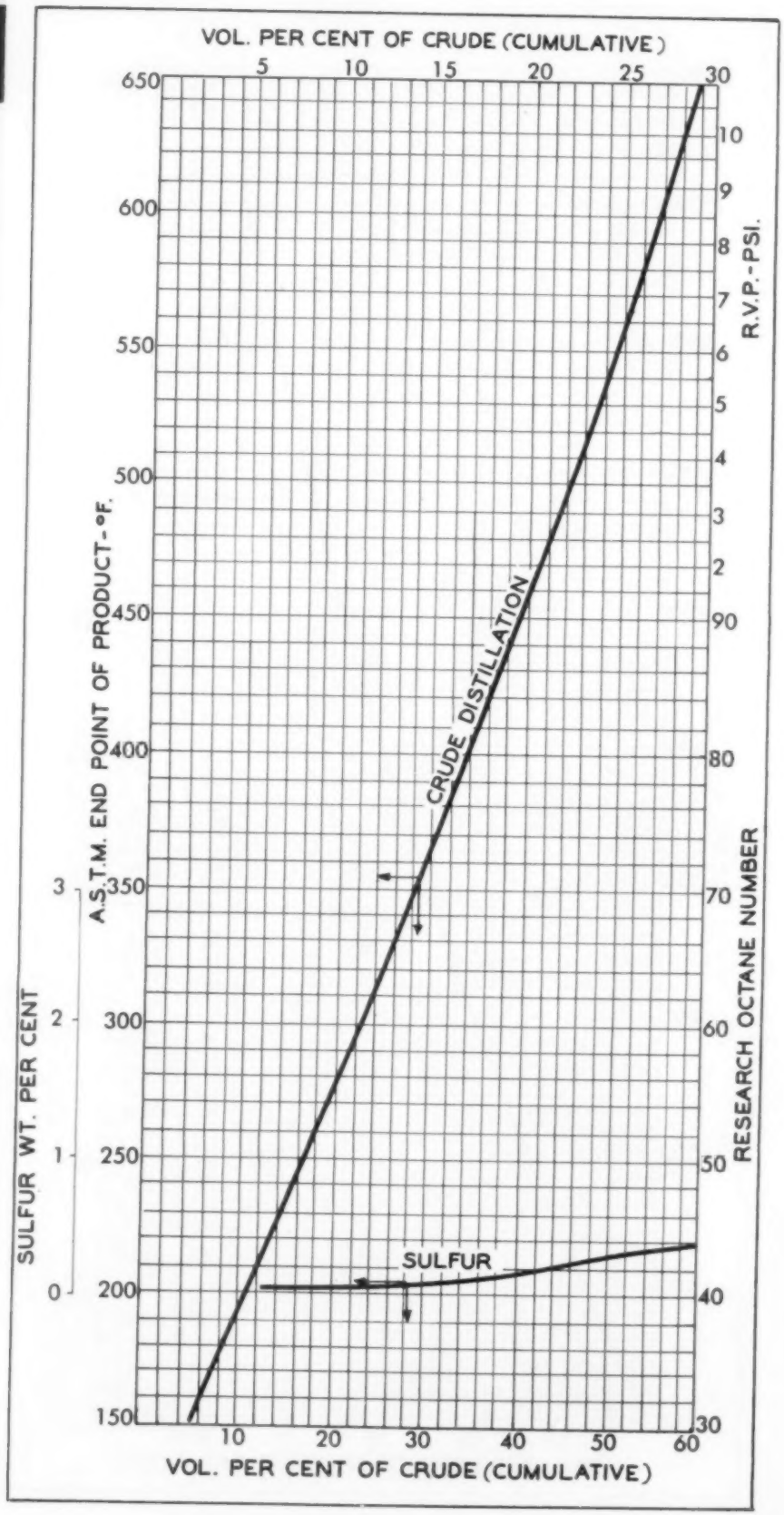
Diesel Fuel:
Yield, vol. %: 26.7
I.b.p., °F.: 446
E.p., °F.: 644
Gravity, °API: 35.6
Sulfur, wt. %: 0.18
Cetane No.: 43
Viscosity S.U. at 100° F.: 38

Wide-Range Gas Oil:
I.b.p., °F.: 434
E.p., °F.: 890
Sulfur, wt. %: 0.63
Gravity, °API: 28.0

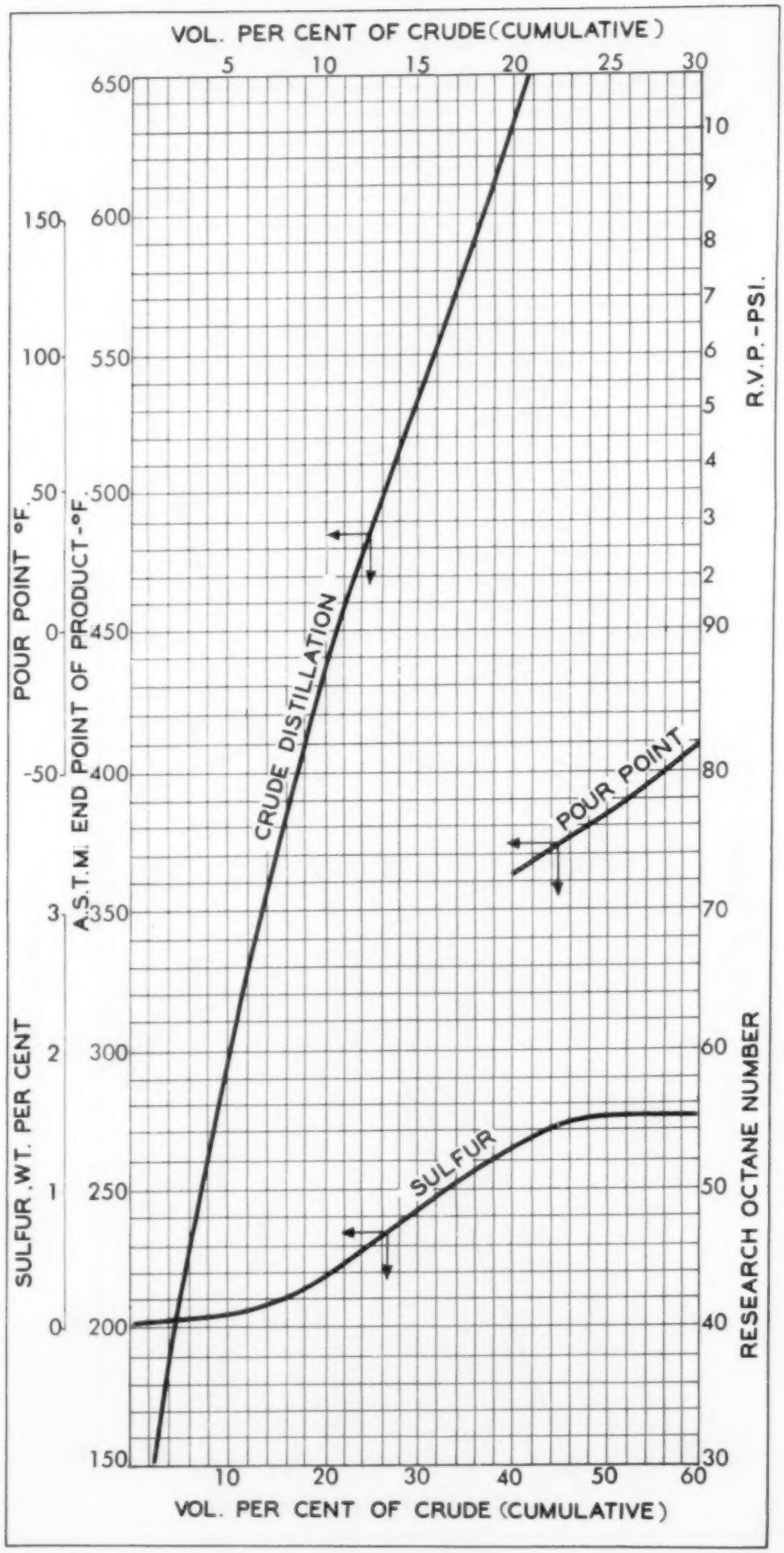
Heavy Fuel Oil: (650°+)
Yield, vol. %: 41.8
Gravity, °API: 16.9
Sulfur, wt. %: 0.66
Viscosity: 166 SFS at 122° F.

Asphalt (85-100 penetration)
Yield, vol. %: 14.3
Gravity, °API: 7.0
Penetration at 77° F.: 30

*$K = (TB)^{1/3}/S$



LOS ANGELES BASIN



Crude:
Type: Wilmington field
Gravity, °API: 21.7
Sulfur, wt. %: 1.43
Viscosity S.U. at 70° F.: 549; at 100° F.: 217
Posted price: $3.02
F.o.b.: Field

Light Naphtha (debutanized):
Yield, vol. %: 27
E.p., °F.: 200
Gravity, °API: 70.3
Sulfur, wt. %: 0.03

Heavy Naphtha:
Yield, vol. %: 9.5
I.b.p., °F.: 219
E.p., °F.: 350
Gravity, °API: 51.4
Sulfur, wt. %: 0.08
Char. factor:* 12.0
Naphthenes, vol. %: 67
Aromatics, vol. %: 8
Paraffins, vol. %: 25

Diesel Fuel:
Yield, vol. %: 21.0
I.b.p., °F.: 450
E.p., °F.: 655
Gravity, °API: 30.0
Sulfur, wt. %: 0.95
Cetane No.: 39.0
Viscosity S.U. at 100° F.: 50

Wide-Range Gas Oil:
I.b.p., °F.: 430
E.p., °F.: 880
Sulfur, wt. %: 1.19
Gravity, °API: 246

Heavy Fuel Oil: (650°+)
Yield, vol. %: 57.0
Gravity, °API: 11.2
Sulfur, wt. %: 1.99
Viscosity: 66 SFS at 210° F.

Asphalt: (85-100 penetration)
Yield, vol. %: 34.4
Gravity, °API: 7.1
Penetration at 77° F.: 53

*$K = (TB)^{1/3}/S$

LEDUC-WOODBEND

Crude:
Gravity, °API: 39.7
Sulfur, wt. %: 0.28
Viscosity S.U. at 100° F.: 39
Posted price: $2.74, 2-3-58
F.o.b.: At well

Light Naphtha:
Debutanized
Yield, vol. %: 18.9
E.p., °F.: 250
Gravity, °API: 67.3
Sulfur, wt. %: 0.04

Heavy Naphtha:
Yield, vol. %: 14.2
I.b.p., °F.: 300
E.p., °F.: 430
Gravity, °API: 45.9
Sulfur, wt. %: 0.04
Char. factor:° 11.75

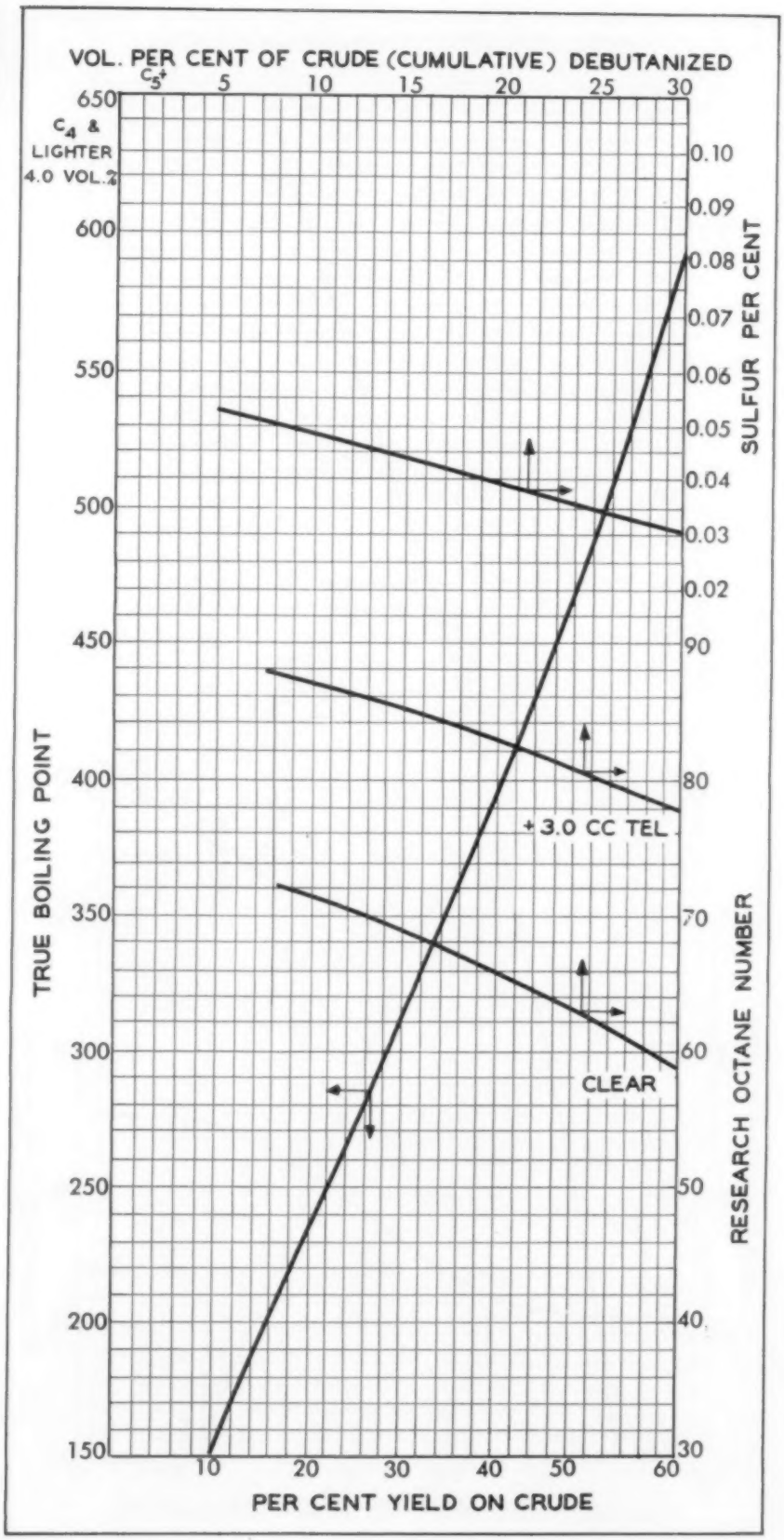
Diesel Fuel:
Yield, vol. %: 22.3
I.b.p., °F.: 430
E.p., °F.: 650
Sulfur, wt. %: 0.24
Cetane No.: 50
Diesel index: 57
Viscosity S.U. at 100° F.: 37

Wide-Range Gas Oil (heavy):
I.b.p., °F.: 650
E.p., °F.: 950
Sulfur, wt. %: 0.46
Gravity, °API: 26.5

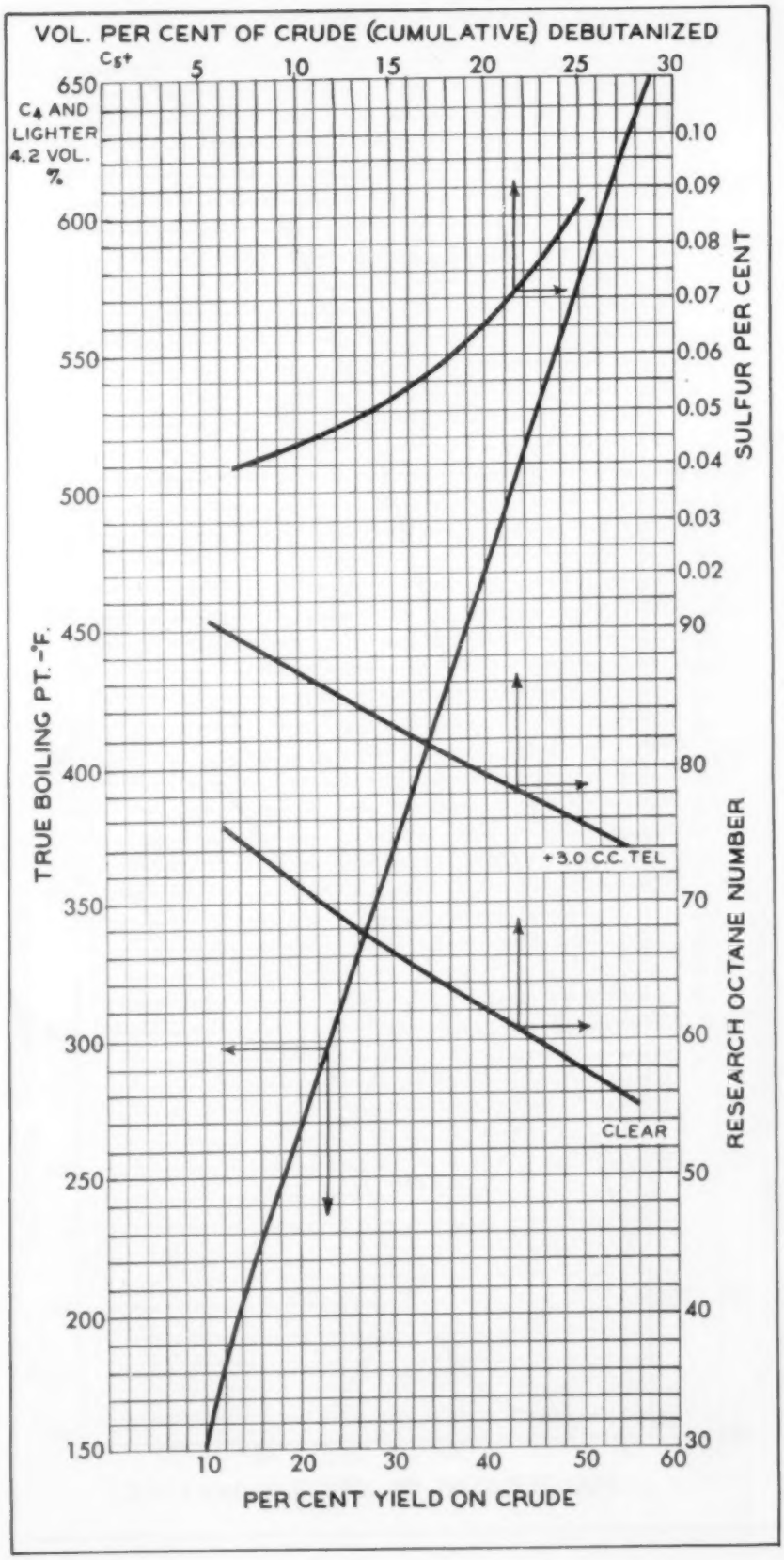
Heavy Fuel Oil: (1,100°+)
Yield, vol. %: 6.2
Gravity, °API: 10.6
Sulfur, wt. %: 0.76
Viscosity S.F. at 250° F.: 95

Availability (prod., B/D): 52,000
Principal producing companies: Imperial Oil, Ltd.

°K = $(TB)^{1/3}/S$
NOTE: All temperatures are true boiling.



REDWATER CRUDE



Crude:
Gravity, °API: 34.7
Sulfur, wt. %: 0.539
Viscosity S.U. at 100° F.: 46
Posted price: $2.63, 2-3-58
F.o.b.: At well

Light Naphtha:
Yield, vol. %: 13.9
E.p., °F.: 250
Gravity, °API: 69.5
Sulfur, wt. %: 0.05

Heavy Naphtha:
Yield, vol. %: 13.0
I.b.p., °F.: 300
E.p., °F.: 430
Gravity, °API: 45.8
Sulfur, wt. %: 0.13
Char. factor:* 11.75

Diesel Fuel:
Yield, vol. %: 20.8
I.b.p., °F.: 430°
E.p., °F.: 650
Sulfur, wt. %: 0.31
Cetane No.: 51
Diesel index: 56
Viscosity S.U. at 100° F.: 38

Wide-Range Gas Oil (heavy):
I.b.p., °F.: 650
E.p., °F.: 950
Sulfur, wt. %: 0.60
Gravity, °API: 27.0

Heavy Fuel Oil: (1,100°+)
Yield, vol. %: 11.3
Gravity, °API: 6.5
Sulfur, wt. %: 1.28
Viscosity S.F. at 250° F.: 660

Availability (prod., B/D): 63,000
Principal producing company: Imperial Oil, Ltd.

*$K = (TB)^{1/3}/S$
NOTE: All temperatures are true boiling.

FOSTERTON CRUDE

Crude:
Type: Intermediate
Gravity, °API: 24.1
Sulfur, wt. %: 2.79
Viscosity, S.U.s. at 100° F.: 139.6
Pour pt., °F.: 15
Con. carbon: 7.8

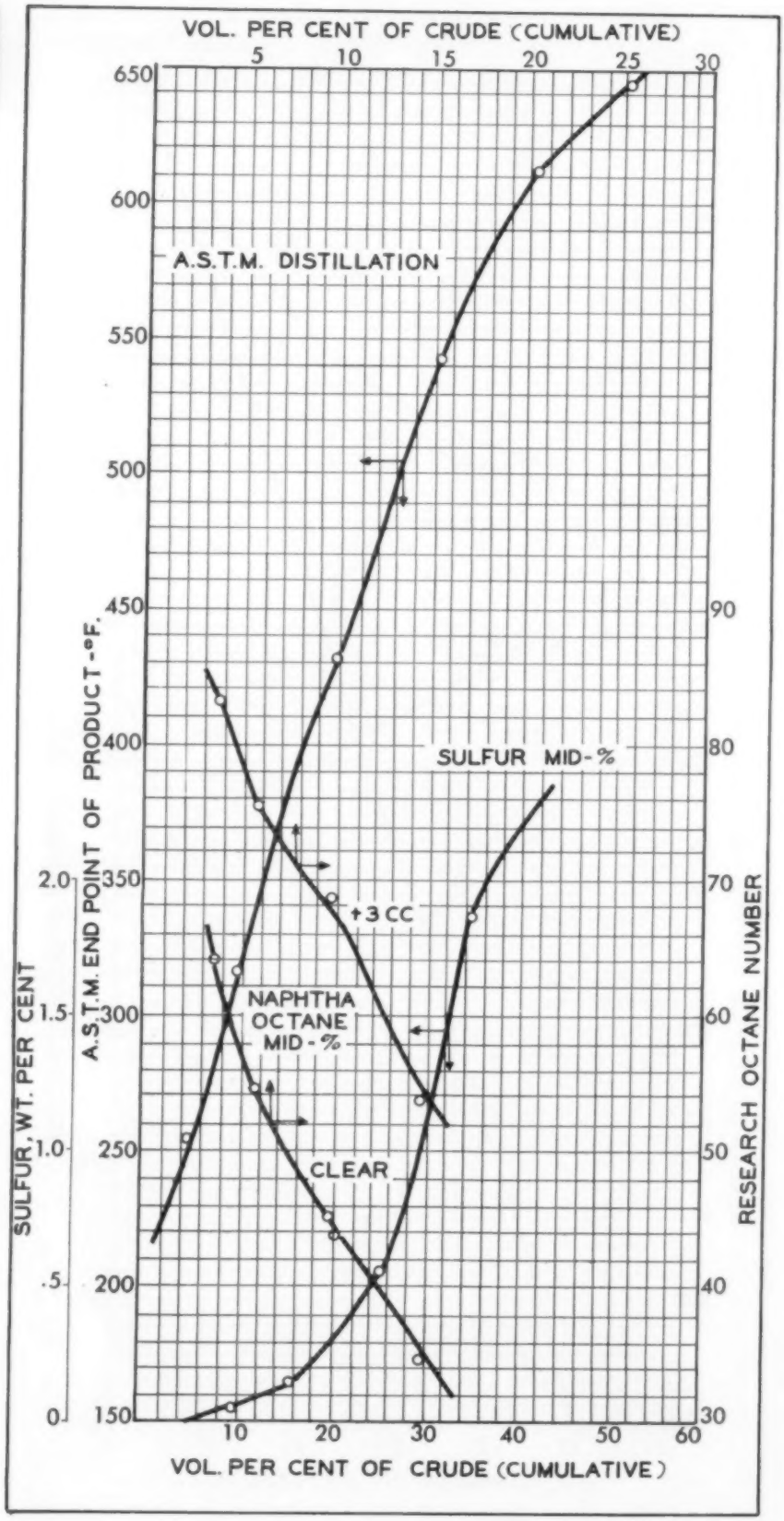
Light Naphtha:
Debutanized
Yield, vol. %: 6.1
E.p., °F.: 256
Gravity, °API: 75
Sulfur, wt. %: 0.016
R.v.p., psi.: 8.3

Heavy Naphtha:
Yield, vol. %: 8.6
I.b.p., °F.: 286
E.p., °F.: 399
Gravity, °API: 49.9
Sulfur, wt. %: 0.15
Naphthenes, vol. %: 39
Aromatics, vol. %: 13
Paraffins, vol. %: 48

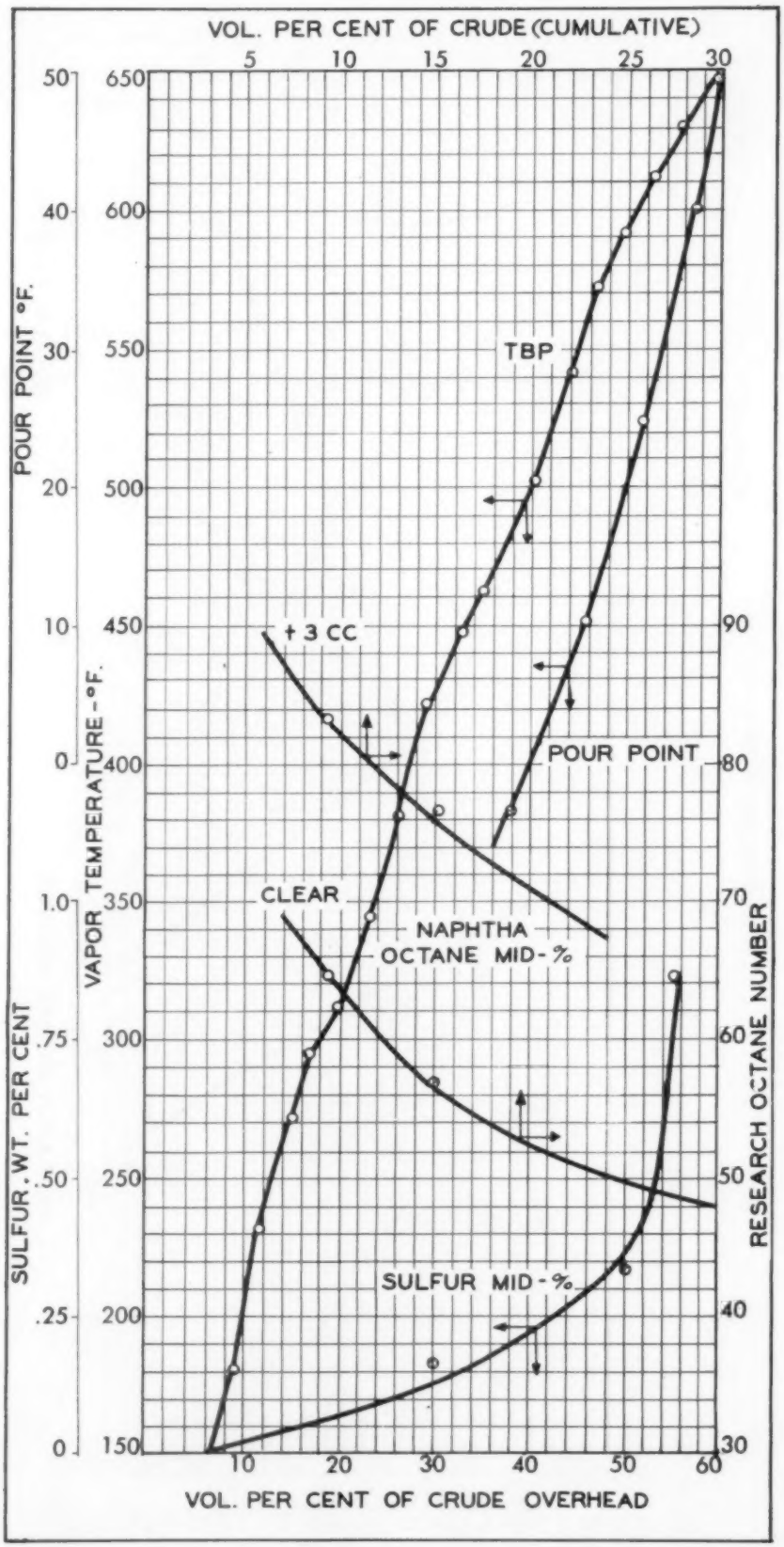
Diesel Fuel:
Yield, vol. %: 21.0
I.b.p., °F.: 470
E.p., °F.: 650
Gravity, °API: 30.0
Sulfur, wt. %: 1.87
Cetane No.: 49.4
Aniline pt.: 138.7
Viscosity, S.U.s. at 100° F.: 41.5

Reduced Crude: (490°+)
Yield, vol. %: 74.5
Gravity, °API: 16.0
Viscosity, S.U.s. at 210° F.: 99.5

Residuum:
Yield, vol. %: 41.7
Gravity, °API: 8.0
Viscosity, KV at 210° F.: 312.7
Sulfur, wt. %: 4.06
Pour pt., °F.: 85



PEMBINA CRUDE



Crude:
Type: Intermediate
Gravity, °API: 32.7
Sulfur, wt. %: 0.83
Viscosity, S.U.s. at 100° F.: 43
Carbon residue, %: 2.99

Light Naphtha:
Debutanized
Yield, vol. %: 15.1
E.p., °F.: 296
Gravity, °API: 60.3
Sulfur, wt. %: 0.05
R.v.p., psi.: 5.0

Total Naphtha:
Yield, vol. %: 24.3
I.b.p., °F.: 140
E.p., °F.: 390
Gravity, °API: 54.7
Sulfur, wt. %: 0.06
R.v.p., psi.: 3.5

Kerosine: (287°-569°)
Yield, vol. %: 30.0
I.b.p., °F.: 322
E.p., °F.: 545
Gravity, °API: 39.6
Sulfur, wt. %: 0.16
IP smoke pt.: 18
Diesel index: 53.5
Aniline pt.: 135

No. 2 Fuel Oil:
Yield, vol. %: 38.6
I.b.p., °F.: 360
E.p., °F.: 620
Sulfur, wt. %: 0.33
Gravity, °API: 36.2

Gas Oil:
Yield, vol. %: 14.4
Gravity, °API: 29.7
Sulfur, wt. %: 0.86
Diesel index: 48.9
Viscosity, S.s.U. at 130° F.: 41

Residuum: (833+)
Yield, vol. %: 25.0
Gravity, °API: 13.8
Viscosity, S.s.U. at 210° F.: 418
Carbon residue, %: 11.7
Sulfur, wt. %: 1.87

Company: Socony Mobil Oil Co. of Canada, Ltd.

PARENTIS CRUDE

Crude:
Gravity, °API: 32.5
Sulfur, wt. %: 0.39
Viscosity S.U. at 70° F.: 58.23
Posted price: (No Posting)
F.o.b.: Ambes

Light Naphtha:
Depropanized
Yield, vol. %: 13.35
E.p., °F.: 250
Gravity, °API: 74.7
Sulfur, wt. %: 0.02

Heavy naphtha:
Yield, vol. %: 10.0
I.b.p., °F.: 300
E.p., °F.: 400
Gravity, °API: 49.5
Sulfur, wt. %: 0.04
Char. factor:* 11.9

Diesel Fuel:
Yield, vol. %: 34.3
I.b.p., °F.: 400
E.p., °F.: 700
Sulfur, wt. %: 0.21
Diesel index: 54.2
Viscosity S.U. at 100° F.: 39.8

Wide-Range Gas Oil: Heavy
I.b.p., °F.: 580
E.p., °F.: 700
Sulfur, wt. %: 0.31
Gravity, °API: 29.8

Heavy Fuel Oil: (930 +)
Yield, vol. %: 19.9
Gravity, °API: 10.1
Sulfur, wt. %: 1.02
Viscosity S.U. at 210° F.: 1,798

Availability (Prod., B/D): 24,000
Principal producing companies: Esso Rep.†

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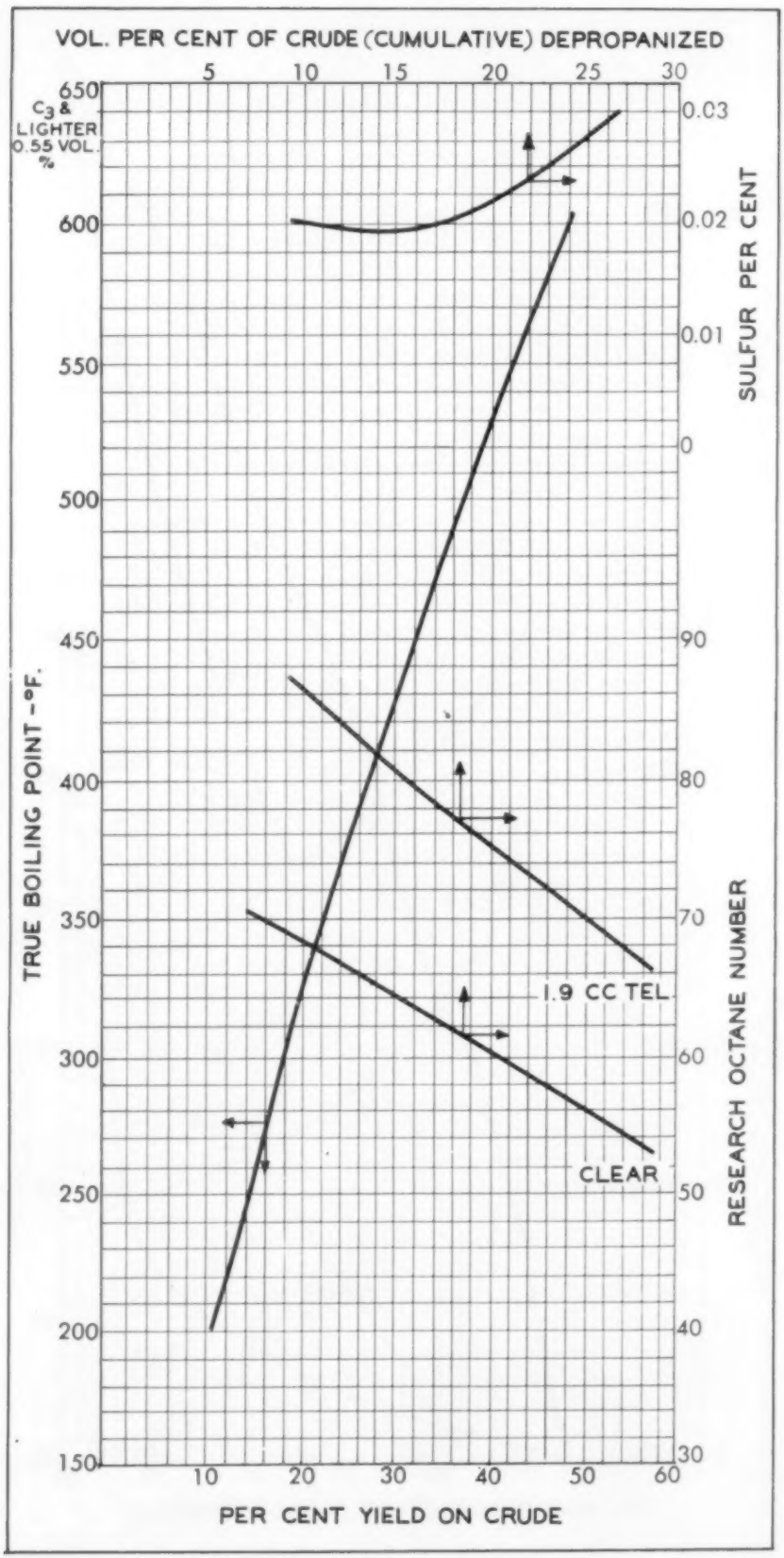
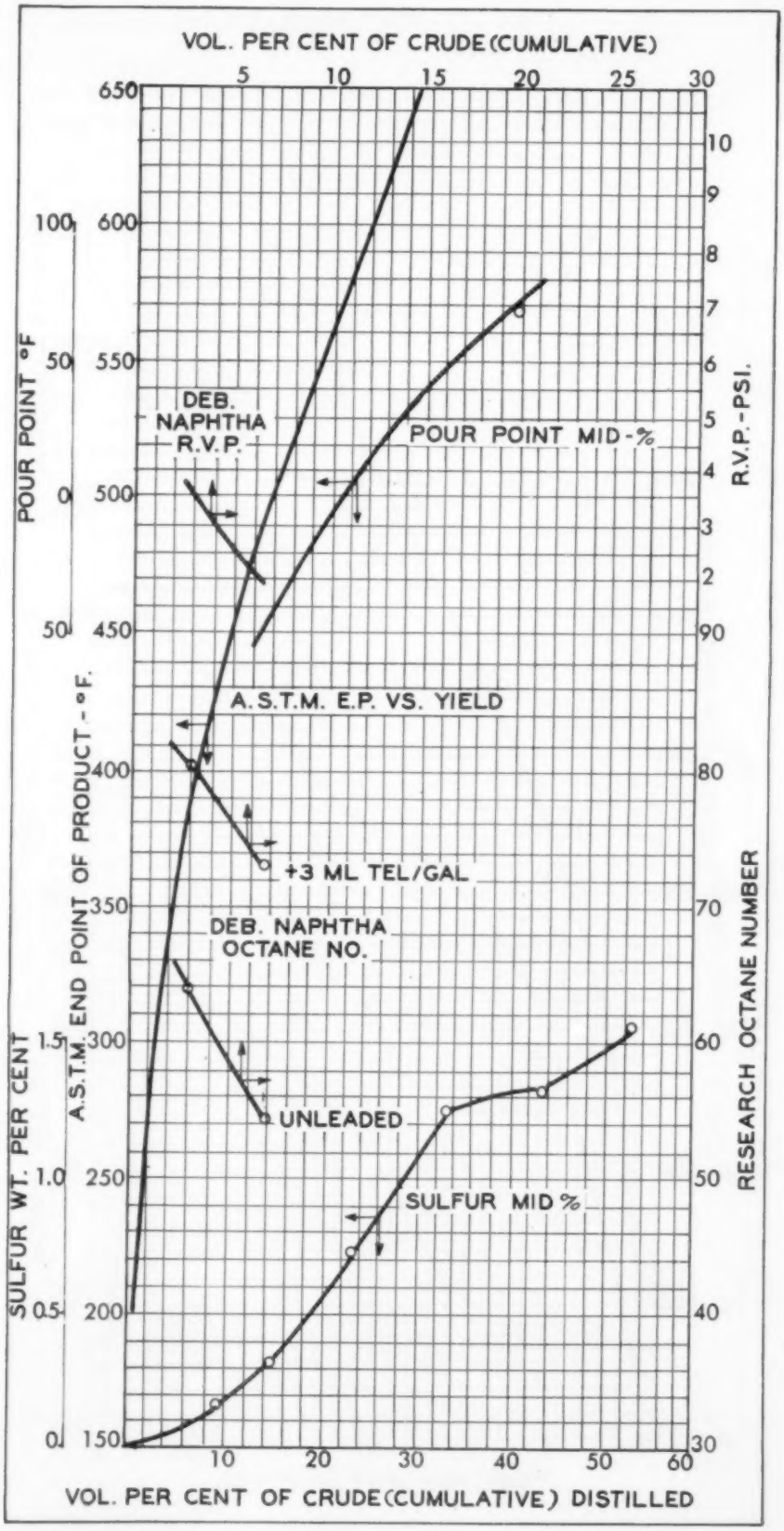
*$K = (TB)^{1/3}/S$

†Soc. Esso de Recherches et d'Exploitation Petrolieres.

NOTE: All temperatures are true boiling.



RAGUSA CRUDE



Crude:
Type: Intermediate
Gravity, °API: 19.8
Sulfur, wt. %: 2.3
Viscosity, S.U.s. at 100° F.: 1,280
C_4 and lighter, vol. %: 0.2
F.o.b.: Augusta, Sicily

Light Naphtha:
Debutanized
Yield, vol. %: 3.4
E.p., °F.: 300
Gravity, °API: 63.0
Sulfur, wt. %: 0.01

Heavy Naphtha:
Yield, vol. %: 4.0
I.b.p., °F.: 320
E.p., °F.: 400
Gravity, °API: 46.3
Sulfur, wt. %: 0.08
Char. factor:* 11.67
Naphthenes, vol. %: 50.0
Aromatics, vol. %: 15.2
Paraffins, vol. %: 34.4

Diesel Fuel:
Yield, vol. %: 24.7
I.b.p., °F.: 426
E.p., °F.: 650
Gravity, °API: 32.3
Sulfur, wt. %: 0.56
Cetane index: 48.3
Diesel index: 48.1
Viscosity, S.U.s. at 100° F.: 39.4

Wide-Range Gas Oil:†
Yield, vol. %: 26.5
I.b.p., °F.: 700
E.p., °F.: 910
Sulfur, wt. %: 1.5
Gravity, °API: 20.0

Residuum: (650° F.+)
Yield, vol. %: 67.7
Gravity, °API: 12.4
Sulfur, wt. %: 3.0
Ash, wt. %: 0.10
Viscosity, S.U.s. at 210° F.: 1,000

Asphalt: (85-100 penetration)
Yield, vol. %: 41.2
Gravity, °API: 7.5
Penetration at 77° F.: 87
Softening pt., °F.: 118

Company: Gulf Italia Co.

*$K = \frac{(TB)^{1/3}}{S}$
†Between 650° F. ASTM e.p. diesel fuel and 85-100 penetration asphalt.

BOSCAN CRUDE

Crude:
Type: Asphaltic
Gravity, °API: 10.1
Sulfur, wt. %: 5.5
Viscosity: 2,600 S.F. at 122° F.
Posted price: $1.90
F.o.b.: Bajo Grande, Venezuela

SR Naphtha:
Yield, vol. %: 4.0
I.b.p., °F.: 138
E.p., °F.: 405
Gravity, °API: 50.1
Sulfur, wt. %: 1.21

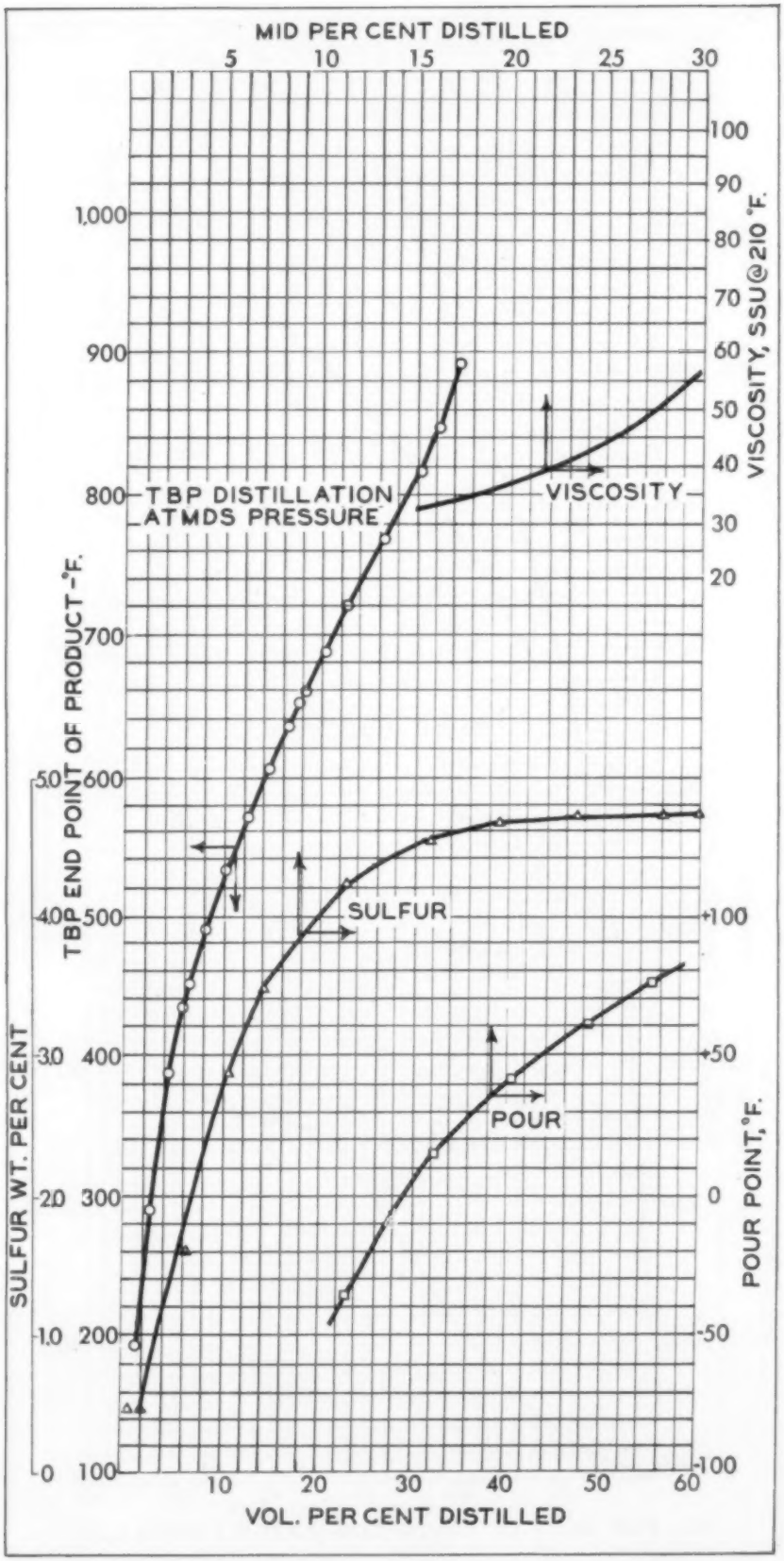
Fuel Oil No. 2:
Yield, vol. %: 7.1
I.b.p., °F.: 535
E.p., °F.: 618
Sulfur, wt. %: 4.30
Viscosity: S.s.U. at 100° F.: 42

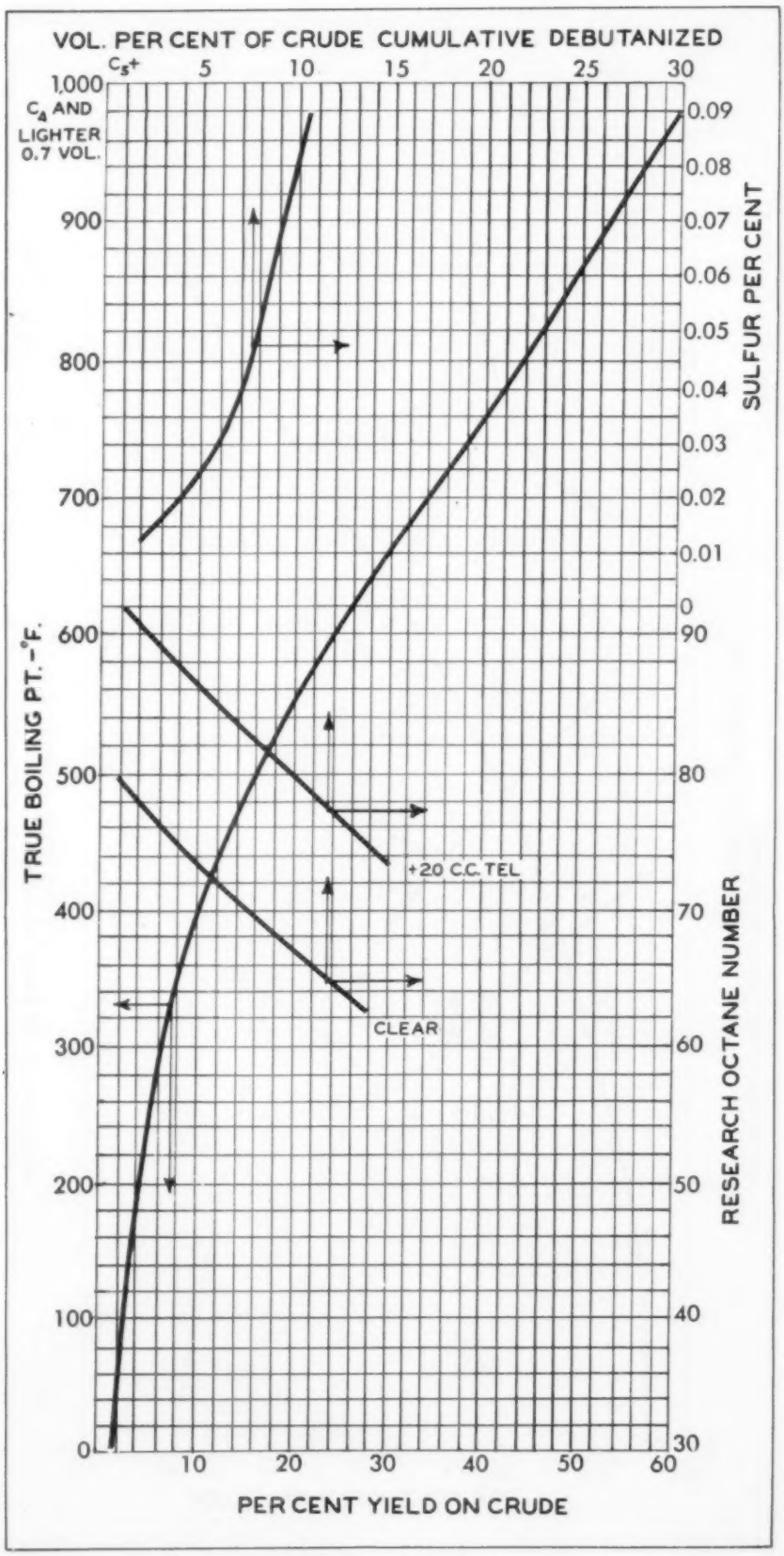
Wide-Range Gas Oil:
I.b.p., °F.: 535
E.p., °F.: 867
Sulfur, wt. %: 4.5
Gravity, °API: 21.2

Heavy Fuel Oil (650°+)
Yield, vol. %: 84.4
Gravity, °API: 6.3
Sulfur, wt. %: 6.00
Viscosity, S.F. at 210°: 870

Asphalt: (85-100 penetration)
Yield, vol. %: 75
Gravity, °API: 5.0
Penetration at 77° F.: 85

Availability (prod., B/D): 100,000
Company: Richmond Exploration Co.





LAGUNILLAS HEAVY

Crude:
Type: Asphaltic, nonparaffinic
Gravity, °API: 17.8
Sulfur, wt. %: 2.18
Viscosity S.U. at 100° F.: 1,025
Posted price: $2.38, 1-22-58
F.o.b.: Amuay*

Light Naphtha:
Debutanized
Yield, vol. %: 2.8
E.p., °F.: 225
Gravity, °API: 66.7
Sulfur, wt. %: 0.016

Heavy Naphtha:
Yield, vol. %: 7.4
I.b.p., °F.: 225
E.p., °F.: 430
Gravity, °API: 43.7
Sulfur, wt. %: 0.10
Char. factor:† 11.45
Aromatics, vol. % 16.2

Diesel Fuel:
Yield, vol. %: 31.1
I.b.p., °F.: 350
E.p., °F.: 750
Sulfur, wt. %: 1.11
Cetane No.: 37
Diesel index: 40
Viscosity S.U. at 100° F.: 43

Wide-Range Gas Oil (heavy):
I.b.p., °F.: 650
E.p., °F.: 850
Sulfur, wt. %: 1.84
Gravity, °API: 21.0

Heavy Fuel Oil: (1,040°+) Resid.
Yield, vol. %: 35.3
Gravity, °API: 4.8
Sulfur, wt. %: 3.25
Viscosity S.U. at 275° F.: 1,810

Asphalt: (85-100 penetration)
Yield, vol. %: 46.9
Gravity, °API: 7.4
Penetration at 77° F.: 95
Viscosity S.F. at 275° F.: 194

Availability (prod., B/D): 60,000
Principal producing companies: Creole Petroleum Corp.

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*F.o.b. La Salina 3c/B below Amuay.
†$K = (TB)^{1/3}/S$
NOTE: All temperatures are true boiling.

BACHAQUERO HEAVY

Crude:
Type: Nonparaffinic
Gravity, °API: 17.0
Sulfur, wt. %: 2.44
Viscosity S.U. at 100° F.: 1,164
Posted price: $2.23, 1-22-58
F.o.b.: Amuay*

Light Naphtha:
Debutanized
Yield, vol. %: 2.8
E.p., °F.: 225
Gravity, °API: 67.5
Sulfur, wt. %: 0.015

Heavy Naphtha:
Yield, vol. %: 7.0
I.b.p., °F.: 200
E.p., °F.: 400
Gravity, °API: 49.0
Sulfur, wt. %: 0.09
Char. factor:† 11.63
Naphthenes, vol. %: 47.6
Aromatics, vol. %: 8.1
Paraffins, vol. %: 42.3

Diesel Fuel:
Yield, vol. %: 31.4
I.b.p., °F.: 350
E.p., °F.: 750
Sulfur, wt. %: 1.26
Cetane No.: 36
Diesel index: 37
Viscosity S.U. at 100° F.: 43

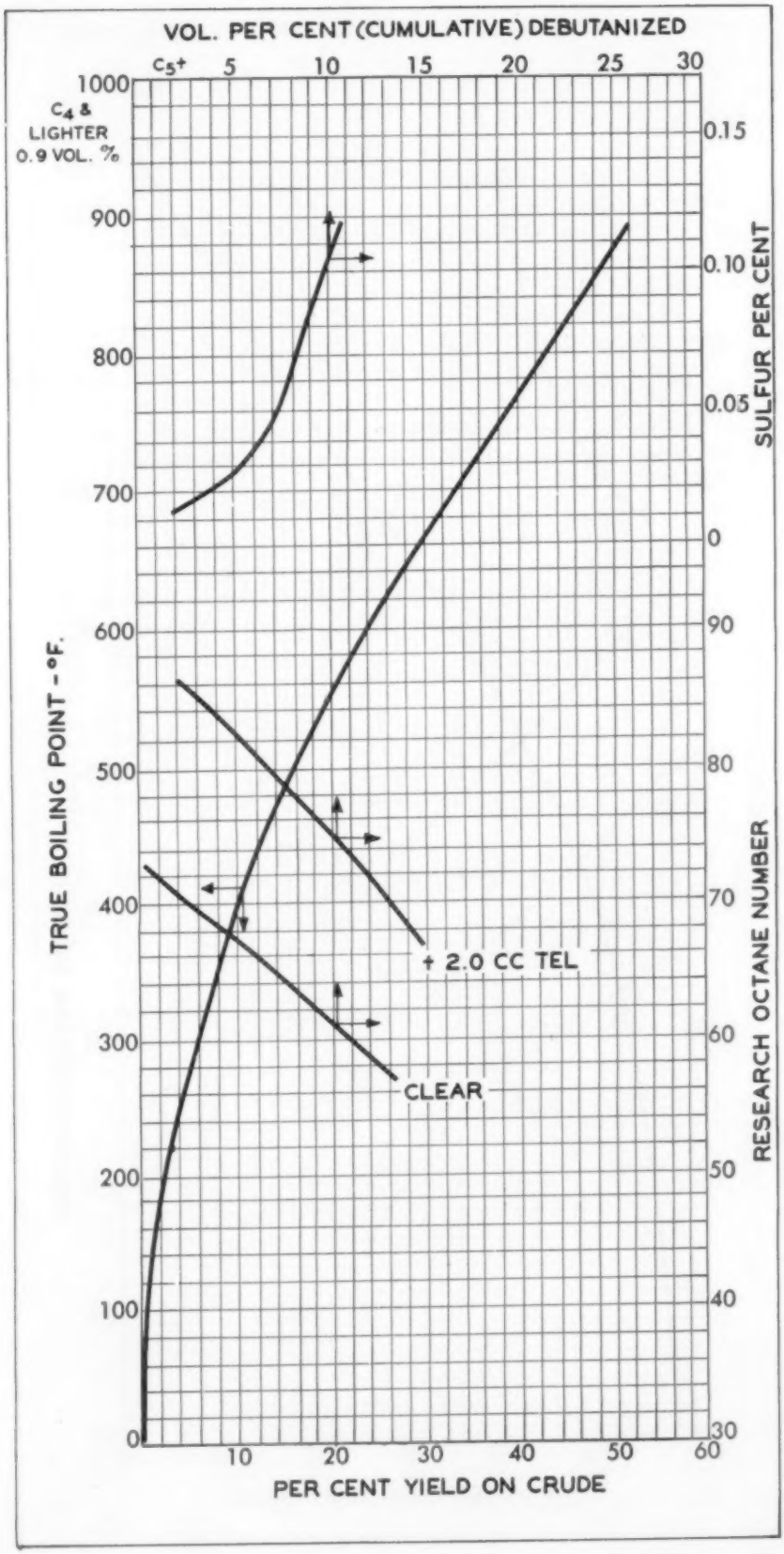
Wide-Range Gas Oil (heavy):
I.b.p., °F.: 650
E.p., °F.: 850
Sulfur, wt. %: 2.1
Gravity, °API: 19.5

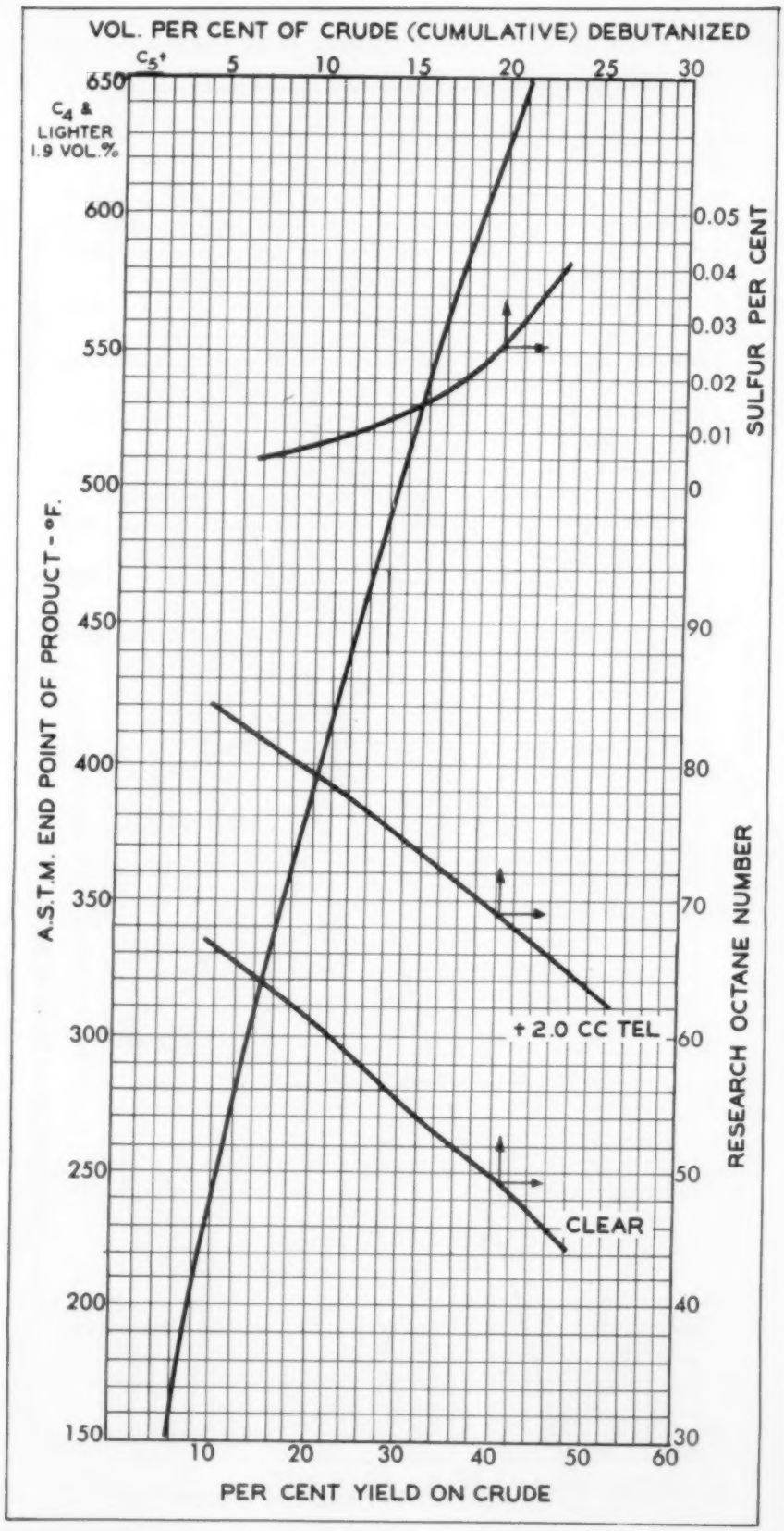
Heavy Fuel Oil: (1,020°+) Resid.
Yield, vol. %: 36.4
Gravity, °API: 4.1
Sulfur, wt. %: 3.69
Viscosity S.F. at 275° F.: 1,042

Asphalt: (85-100 penetration)
Yield, vol. %: 49.0
Gravity, °API: 6.6; sp. gr., 1,025
Penetration at 77° F.: 95
Viscosity S.F. at 275° F.: 159

Availability (prod., B/D): 260,000
Principal producing companies: Creole Petroleum Corp.

*F.o.b. La Salina, 3c/B below Amuay.
†$K = (TB)^{1/3}/S$
NOTE: All temperatures are true boiling.





TIA JUANA MEDIUM

Crude:
Gravity, °API: 26.7
Sulfur, wt. %: 1.63
Viscosity S.U. at 100° F.: 120
Posted price: $2.55, 1-22-58
F.o.b.: Amuay*

Light Naphtha:
Debutanized
Yield, vol. %: 7.4
E.p., °F.: 225
Gravity, °API: 72.1
Sulfur, wt. %: 0.005

Heavy Naphtha:
Yield, vol. %: 13.8
I.b.p., °F.: 200
E.p., °F.: 400
Gravity, °API: 51.0
Sulfur, wt. %: 0.04
Char. factor:† 11.75
Naphthenes, vol. %: 46.2
Aromatics, vol. %: 10.1
Paraffins, vol. %: 43.5

Diesel Fuel:
Yield, vol. %: 33.2
I.b.p., °F.: 350
E.p., °F.: 750
Sulfur, wt. %: 0.79
Cetane No.: 47
Diesel index: 53
Viscosity S.U. at 100° F.: 39

Wide-Range Gas Oil (heavy):
I.b.p., °F.: 650
E.p., °F.: 850
Sulfur, wt. %: 1.49
Gravity, °API: 25.0

Heavy Fuel Oil: (1,050°+) Resid.
Yield, vol. %: 25.2
Gravity, °API: 6.5
Sulfur, wt. %: 3.14
Viscosity S. F. at 275° F.: 560

Asphalt: (85-100 penetration)
Yield, vol. %: 29.3
Gravity, °API: 7.9; sp. gr. 60/60, 1.015
Penetration at 77° F.: 95
Viscosity S.F. at 275° F.: 223

Availability (prod., B/D): 330,000
Principal producing companies: Creole Petroleum Corp.

*F.o.b. La Salina 3c/B below Amuay.
†$K = (TB)^{1/3}/S$
NOTE: All temperatures are true boiling.

OFICINA LIGHT

Crude:
Type: Mixed base
Gravity, °API: 35.6
Sulfur, wt. %: 0.70
Viscosity S.U. at 100° F.: 39.5
Posted price: $3.05, 1-22-58
F.o.b.: Puerto La Cruz

Light Naphtha:
Debutanized
Yield, vol. %: 13.0
E.p., °F.: 225
Gravity, °API: 67.7
Sulfur, wt. %: 0.006

Heavy Naphtha:
Yield, vol. %: 15.6
I.b.p., °F.: 200
E.p., °F.: 350
Gravity, °API: 50.3
Sulfur, wt. %: 0.008
Char. factor:* 11.6
Naphthenes, vol. %: 35.2
Aromatics, vol. %: 22.1
Paraffins, vol. %: 41.1

Diesel Fuel:
Yield, vol. %: 43.1
I.b.p., °F.: 350
E.p., °F.: 750
Sulfur, wt. %: 0.41
Cetane No.: 50
Diesel index: 52
Viscosity S.U. at 100° F.: 39

Wide-Range Gas Oil (heavy):
I.b.p., °F.: 650°
E.p., °F.: 850°
Sulfur, wt. %: 0.89
Gravity, °API: 26.7

Heavy Fuel Oil: (1,040°+)
Yield, vol. %: 8.7
Gravity, °API: 5.8
Sulfur, wt. %: 2.39
Viscosity S.F. at 275° F.: 517

Availability (prod., B/D): 75,000
Principal producing companies: Creole Petroleum Corp. and Mene Grande Oil Co.

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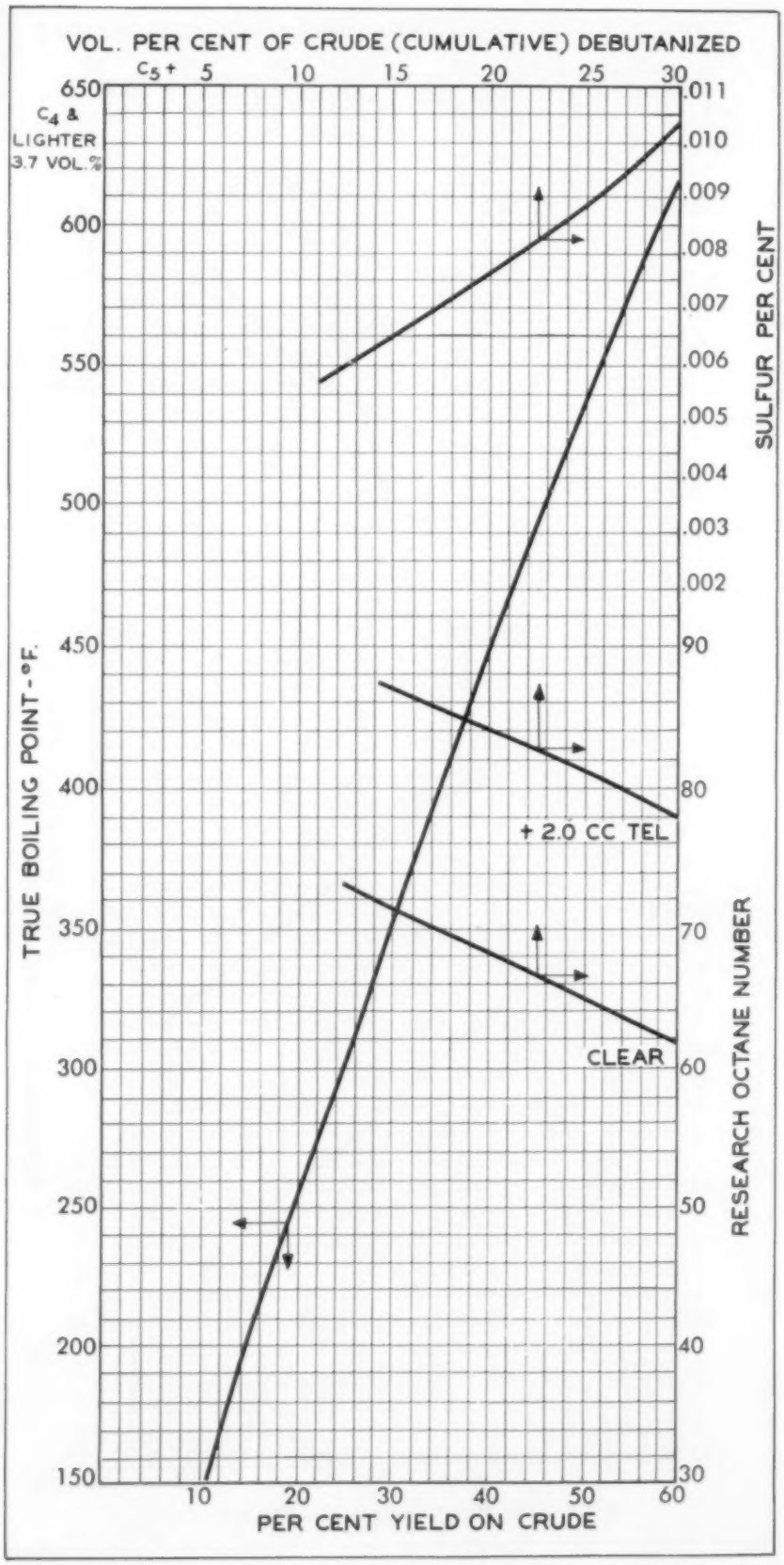
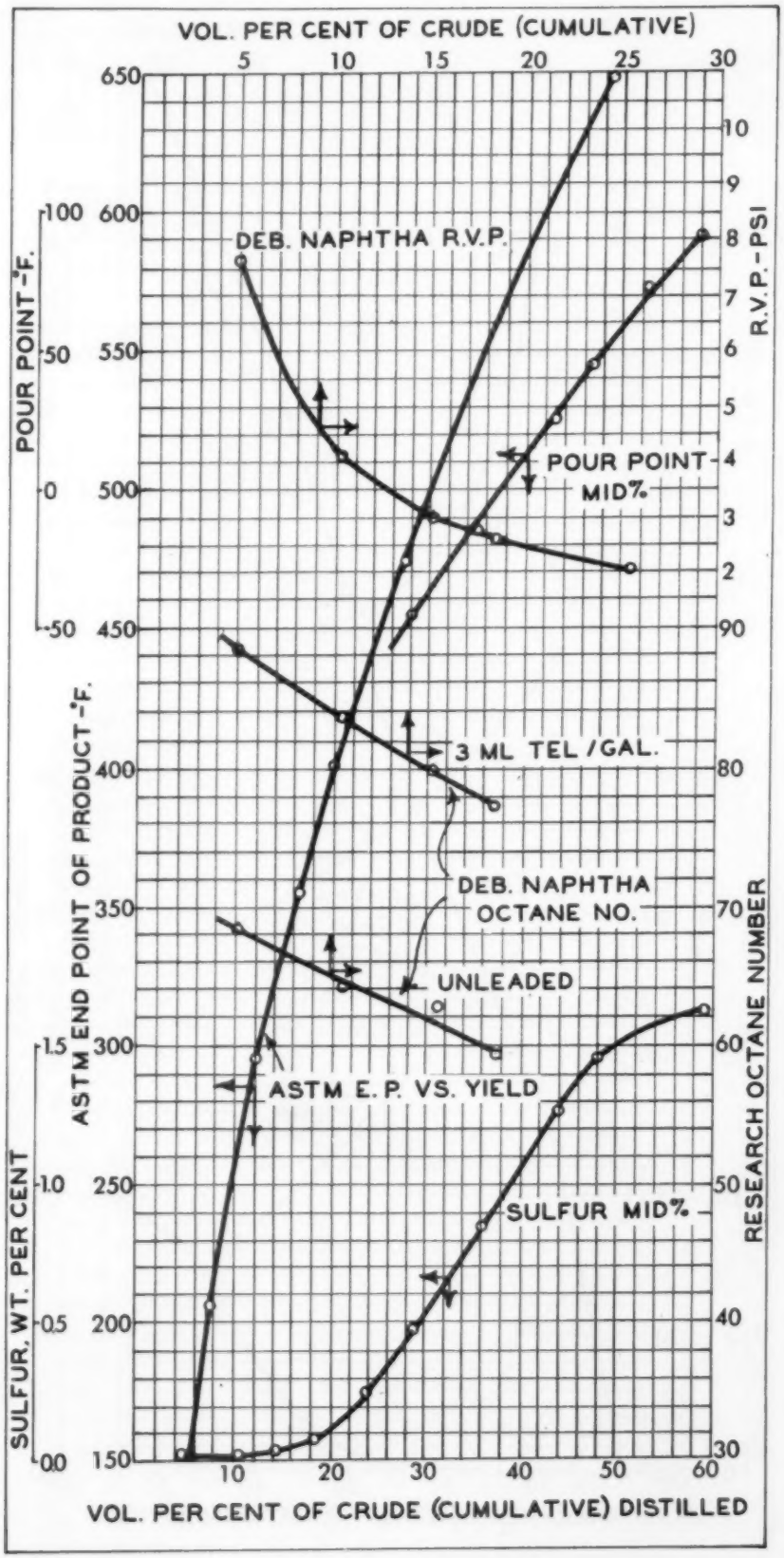
*$K = (TB)^{1/3}/S$
NOTE: All temperatures are true boiling points from t.b.p. curve.



LEONA CRUDE


VOL. PER CENT OF CRUDE (CUMULATIVE)
DEB. NAPHTHA R.V.P.
POUR POINT - MID%
3 ML TEL /GAL.
DEB. NAPHTHA OCTANE NO.
UNLEADED
ASTM E. P. VS. YIELD
SULFUR MID%
POUR POINT - °F.
ASTM END POINT OF PRODUCT - °F.
SULFUR, WT. PER CENT
R.V.P. - PSI
RESEARCH OCTANE NUMBER
VOL. PER CENT OF CRUDE (CUMULATIVE) DISTILLED

Crude:
Type: Intermediate
Gravity, °API: 24.2
Sulfur, wt. %: 1.6
Viscosity, S.U.s. at 100° F.: 153.0
C_4 and lighter, vol. %: 1.4
Posted price: $2.49
F.o.b.: Puerto La Cruz, Venezuela

Night Naphtha:
Debutanized
Yield, vol. %: 10.4
E.p., °F.: 300
Gravity, °API: 61.8
Sulfur, wt. %: 0.01

Heavy Naphtha:
Yield, vol. %: 7.7
I.b.p., °F.: 320
E.p., °F.: 404
Gravity, °API: 44.6
Sulfur, wt. %: 0.05
Char. factor:* 11.60
Naphthenes, vol. %: 45
Aromatics, vol. %: 18
Paraffins, vol. %: 36

Diesel Fuel:
Yield, vol. %: 28.7
I.b.p., °F.: 462
E.p., °F.: 650
Gravity, °API: 30.6
Sulfur, wt. %: 0.81
Cetane index: 45.3
Diesel index: 45.3
Viscosity, S.U.s. at 100° F.: 40.6

Wide-Range Gas Oil:†
Yield, vol. %: 16.8
I.b.p., °F.: 700
E.p., °F.: 875
Sulfur, wt. %: 1.5
Gravity, °API: 22.5

Residuum: (650° F.+)
Yield, vol. %: 51.8
Gravity, °API: 12.4
Sulfur, wt. %: 2.4
Ash, wt. %: 0.05
Viscosity, S.F.s. at 122° F.: 2,170

Asphalt: (85-100 penetration)
Yield, vol. %: 35.0
Gravity, °API: 8.1
Penetration at 77° F.: 90
Softening pt., °F.: 119

Company: Mene Grande Oil Co.

*$K = (TB)^{1/3}/S$
†Between 650° F. ASTM e.p. diesel fuel and 85-100 penetration asphalt.

SYLVESTRE CRUDE

Crude:
Type: Intermediate
Gravity, °API: 28.4
Sulfur, wt. %: 1.02
Viscosity, Kin., at 100° F.: 14.15
R.v.p., psi.: 5.3
Posted price: $2.59
F.o.b.: El Palito

Light Naphtha:
Debutanized
Yield, vol. %: 5.2
E.p., °F.: 186
Gravity, °API: 78.9
Sulfur, wt. %: 0.0005
R.v.p., psi.: 10.8

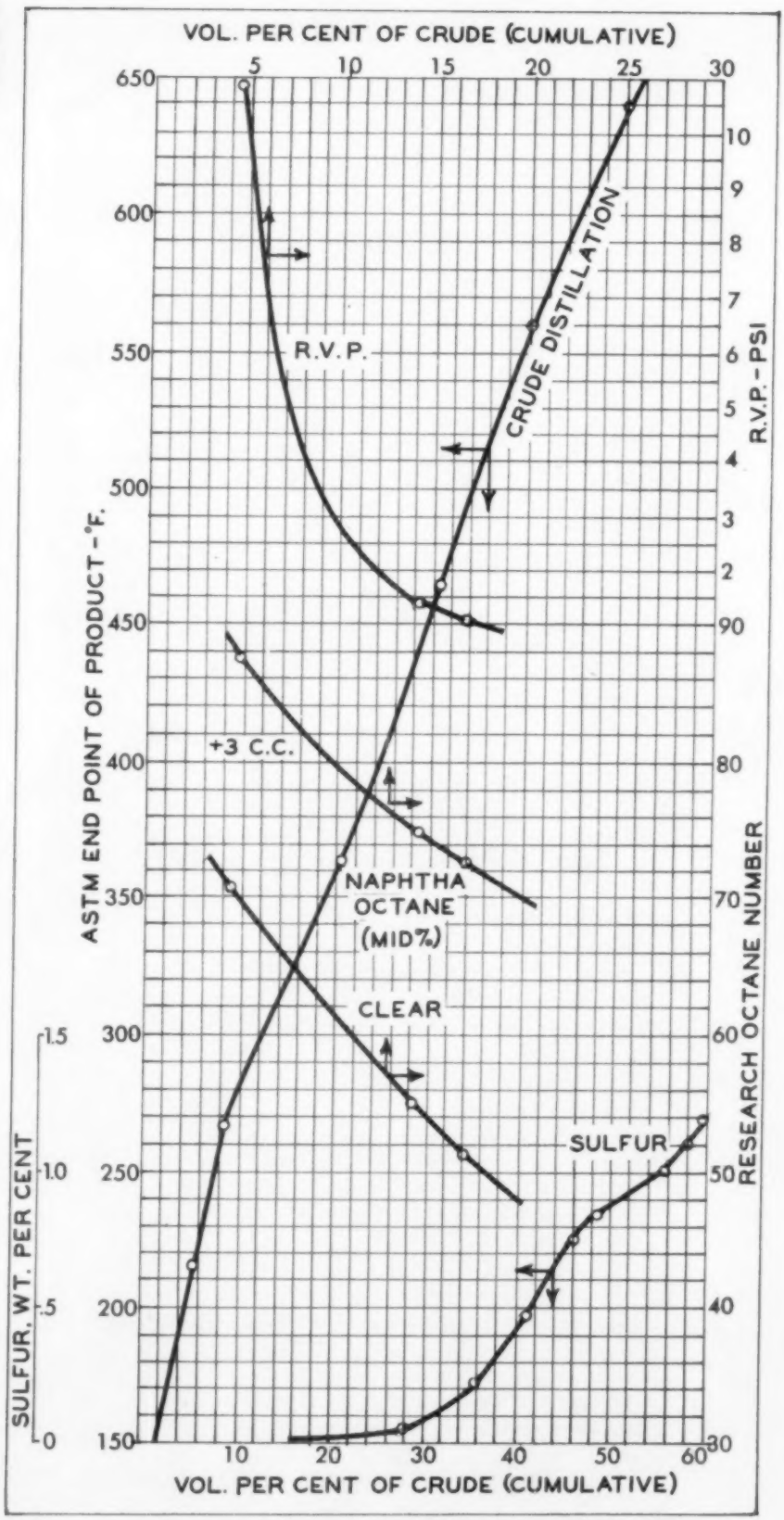
Heavy Naphtha:
Yield, vol. %: 19.0
I.b.p., °F.: 226
E.p., °F.: 386
Gravity, °API: 53.2
Sulfur, wt. %: 0.0054
R.v.p., psi.: 1.1
Naphthenes, vol. %: 49.0
Aromatics, vol. %: 11.3
Paraffins, vol. %: 39.7

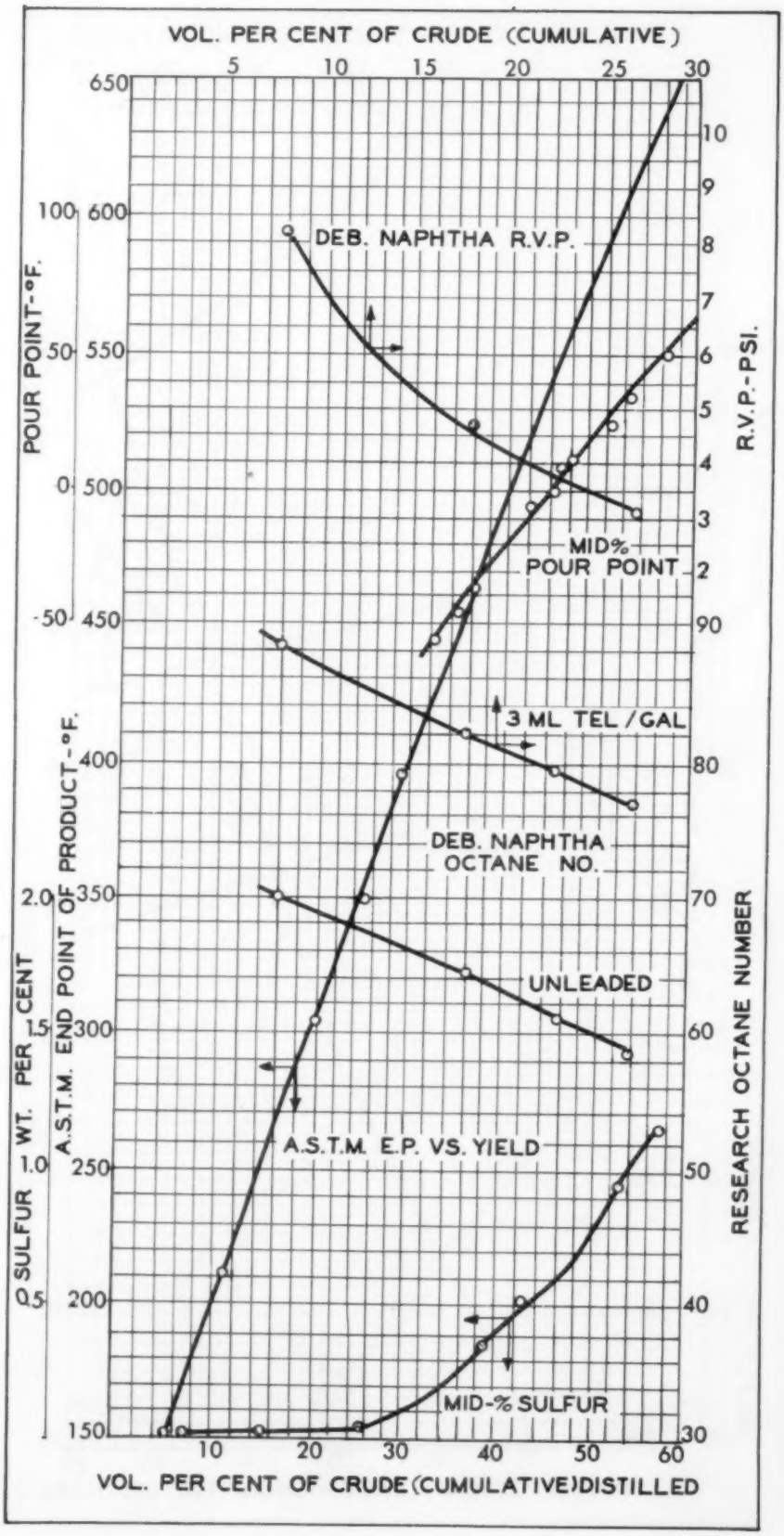
Kerosine:
Yield, vol. %: 13.3
I.b.p., °F.: 408
E.p., °F.: 518
Gravity, °API: 38.0
Sulfur, wt. %: 0.20
Freeze pt., °F.: —53
Diesel index: 52.0
Smoke pt., mm.: 18
Aromatics, vol. %: 20.9

Wide-Range Gas Oil:
Yield, vol. %: 18.3
I.b.p., °F.: 545
E.p., °F.: 654
Sulfur, wt. %: 0.86
Gravity, °API: 30.2
Viscosity, Kin. at 100° F.: 6.66

Reduced Crude: (675° F.+)
Yield, vol. %: 42.4
Gravity, °API: 12.4
Sulfur, wt. %: 1.74
Pour pt., °F.: 75
Viscosity, Kin. at 210° F.: 116.2
Carbon residue, wt. %: 10.1

Availability, B/D: 30,000
Company: Socony Mobil Oil Co. de Venezuela





MESA CRUDE

Crude:
Type: Intermediate
Gravity, °API: 30.0
Sulfur, wt. %: 1.02
Viscosity, S.U.s. at 100° F.: 54.8
C_4 and lighter, vol. %: 2.6
Posted price: $2.79
F.o.b.: Puerto La Cruz, Venezuela

Light Naphtha:
Debutanized
Yield, vol. %: 18.0
E.p., °F.: 304
Gravity, °API: 60.5
Sulfur, wt. %: 0.02

Heavy Naphtha:
Yield, vol. %: 8.7
I.b.p., °F.: 333
E.p., °F.: 405
Gravity, °API: 44.0
Sulfur, wt. %: 0.03
Char. factor:* 11.62
Naphthenes, vol. %: 41
Aromatics, vol. %: 22
Paraffins, vol. %: 36

Diesel Fuel:
Yield, vol. %: 29.3
I.b.p., °F.: 452
E.p., °F.: 650
Gravity, °API: 32.2
Sulfur, wt. %: 0.54
Cetane index: 46.6
Diesel index: 48.6
Viscosity, S.U.s. at 100° F.: 39.0

Wide-Range Gas Oil:†
Yield, vol. %: 20.7
I.b.p., °F.: 700
E.p., °F.: 910
Sulfur, wt. %: 1.2
Gravity, °API: 24.2

Residuum: (650° F.+)
Yield, vol. %: 42.0
Gravity, °API: 15.7
Sulfur, wt. %: 1.7
Ash, wt. %: 0.04
Viscosity, S.F.s. at 122° F.: 340

Asphalt: (85-100 penetration)
Yield, vol. %: 21.3
Gravity, °API: 8.7
Penetration at 77° F.: 89
Softening pt., °F.: 119

Company: Mene Grande Oil Co.

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*$K = (TB)^{1/3}/S$
†Between 650° F. ASTM e.p. diesel fuel and 85-100 penetration asphalt.

ANACO CRUDE

Crude:
Type: Intermediate-Paraffin
Gravity, °API: 41.5
Sulfur, wt. %: 0.15
Viscosity, S.U.s. at 100° F.: 36.2
C_4 and lighter, vol. %: 4.5
Posted price: $3.34
F.o.b.: Puerto La Cruz, Venezuela

Light Naphtha:
Debutanized
Yield, vol. %: 26.0
E.p., °F.: 291
Gravity, °API: 61.6
Sulfur, wt. %: 0.01

Heavy Naphtha:
Yield, vol. %: 10.0
I.b.p., °F.: 326
E.p., °F.: 397
Gravity, °API: 44.3
Sulfur, wt. %: 0.01
Char. factor:* 11.61
Naphthenes, vol. %: 38
Aromatics, vol. %: 28
Paraffins, vol. %: 34

Diesel Fuel:
Yield, vol. %: 28.8
I.b.p., °F.: 450
E.p., °F.: 648
Gravity, °API: 34.6
Sulfur, wt. %: 0.15
Cetane index: 50.7
Diesel index: 54.3
Viscosity, S.U.s. at 100° F.: 38.0

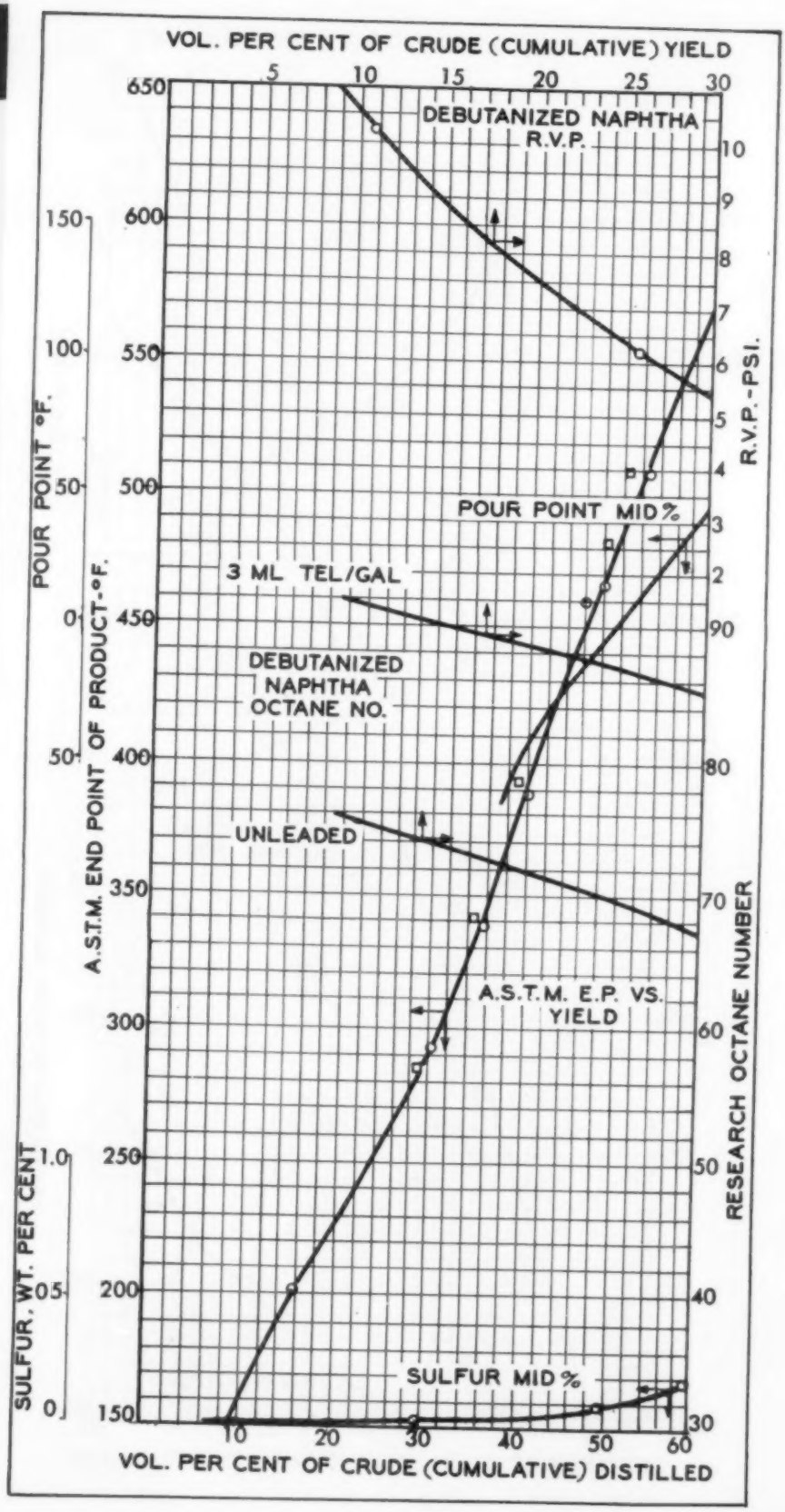
Wide-Range Gas Oil:
Yield, vol. %: 22.3
I.b.p., °F.: 674
E.p., °F.: 890
Sulfur, wt. %: 0.21
Gravity, °API: 31.5

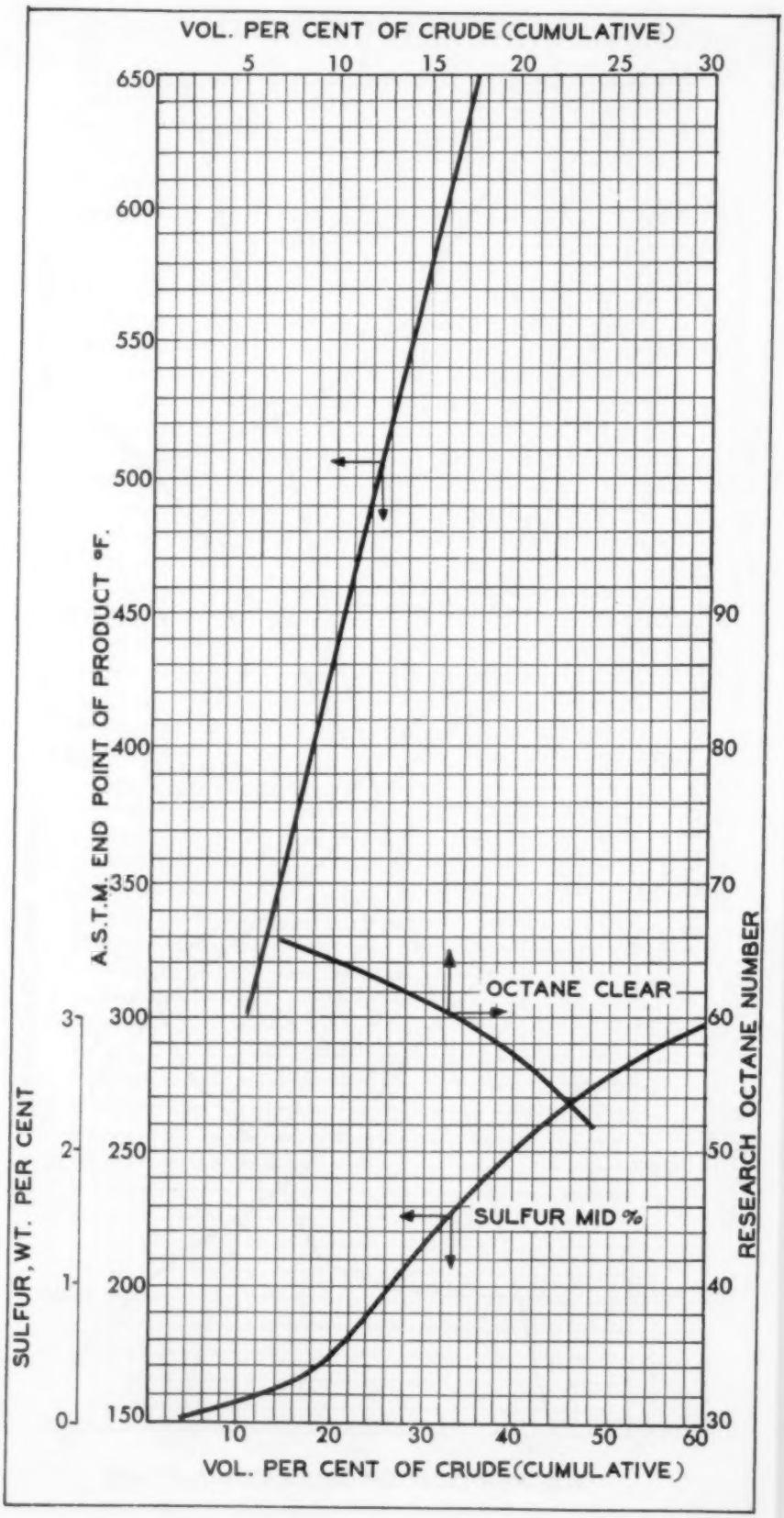
Residuum: (650° F.+)
Yield, vol. %: 30.7
Gravity, °API: 28.1
Sulfur, wt. %: 0.25
Ash, wt. %: 0.03
Viscosity, S.U.s. at 210° F.: 51

Residuum: (After 890° F.-E.p. Gas Oil)
Yield, vol. %: 8.4
Gravity, °API: 18.2
Viscosity, S.U.s. at 210° F.: 213
Pour pt., °F.: +155

Company: Mene Grande Oil Co.

*$K = (TB)^{1/3}/S$





WAFRA CRUDE

Crude:
Type: Wafra, Burghan
Gravity, °API: 24.5
Sulfur, wt. %: 3.2
Viscosity, S.U.s. at 100° F.: 156
Shipping terminal: Mina Saud

Light Naphtha:
Yield, vol. %: 6.7
E.p., °F.: 270
Gravity, °API: 73
Sulfur, wt. %: 0.01

Heavy Naphtha:
Yield, vol. %: 11.4
I.b.p., °F.: 270
E.p., °F.: 430
Gravity, °API: 47
Sulfur, wt. %: 0.2
Char. factor: 11.65
Naphthenes, vol. %: 39
Aromatics, vol. % 17
Paraffins, vol. %: 44

Distillate:
Yield, vol. %: 4.0
I.b.p., °F.: 415
E.p., °F.: 500
Gravity, °API: 42
Sulfur, wt. %: 0.5

Diesel Fuel:
Yield, vol. %: 14.0
I.b.p., °F.: 490
E.p., °F.: 690
Sulfur, wt. %: 1.3
Cetane No.: 50
Diesel index: 53.1
Viscosity, S.U.s. at 100° F.: 40

Wide-Range Gas Oil:
Yield, vol. %: 39.3
E.p., °F.: 90% at 1,010
Sulfur, wt. %: 3.1
Gravity, °API: 21.4

Heavy Bottoms:
Yield, vol. %: 22.4
Gravity, °API: 1.0
Sulfur, wt. %: 6.0

Asphalt:
Yield, vol. %: 25
Gravity, °API: 2.0
Penetration at 77°F.: 100

Availability, B/D, 60,000

KUWAIT EXPORT

Crude:
Type: Intermediate, wax-bearing
Gravity, °API: 31.4
Sulfur, wt. %: 2.5
Viscosity, S.U.s. at 100° F.: 55.5
Posted price: $1.85, 2-19-58, for 31.0°-31.9° API
F.o.b.: Mina-al-Ahmadi, Persian Gulf

Light Naphtha:
Yield, vol. %: 8.4
E.p., °F.: 210
Gravity, °API: 81.3
Sulfur, wt. %: 0.015

Heavy Naphtha:
Yield, vol. %: 14.85
I.b.p., °F.: 216
E.p., °F.: 368
Gravity, °API: 55.9
Sulfur, wt. %: 0.06
Char. factor:* 11.93
Naphthenes, vol. %: 24
Aromatics, vol. %: 14
Paraffins, vol. %: 62

Diesel Fuel:
Yield, vol. %: 23.85
I.b.p., °F.: 385
E.p., °F.: Approx. 630
Gravity, °API: 39.0
Sulfur, wt. %: 1.0
Cetane No.: 57
Diesel index: 62
Viscosity, S.U.s. at 100° F.: 35.6

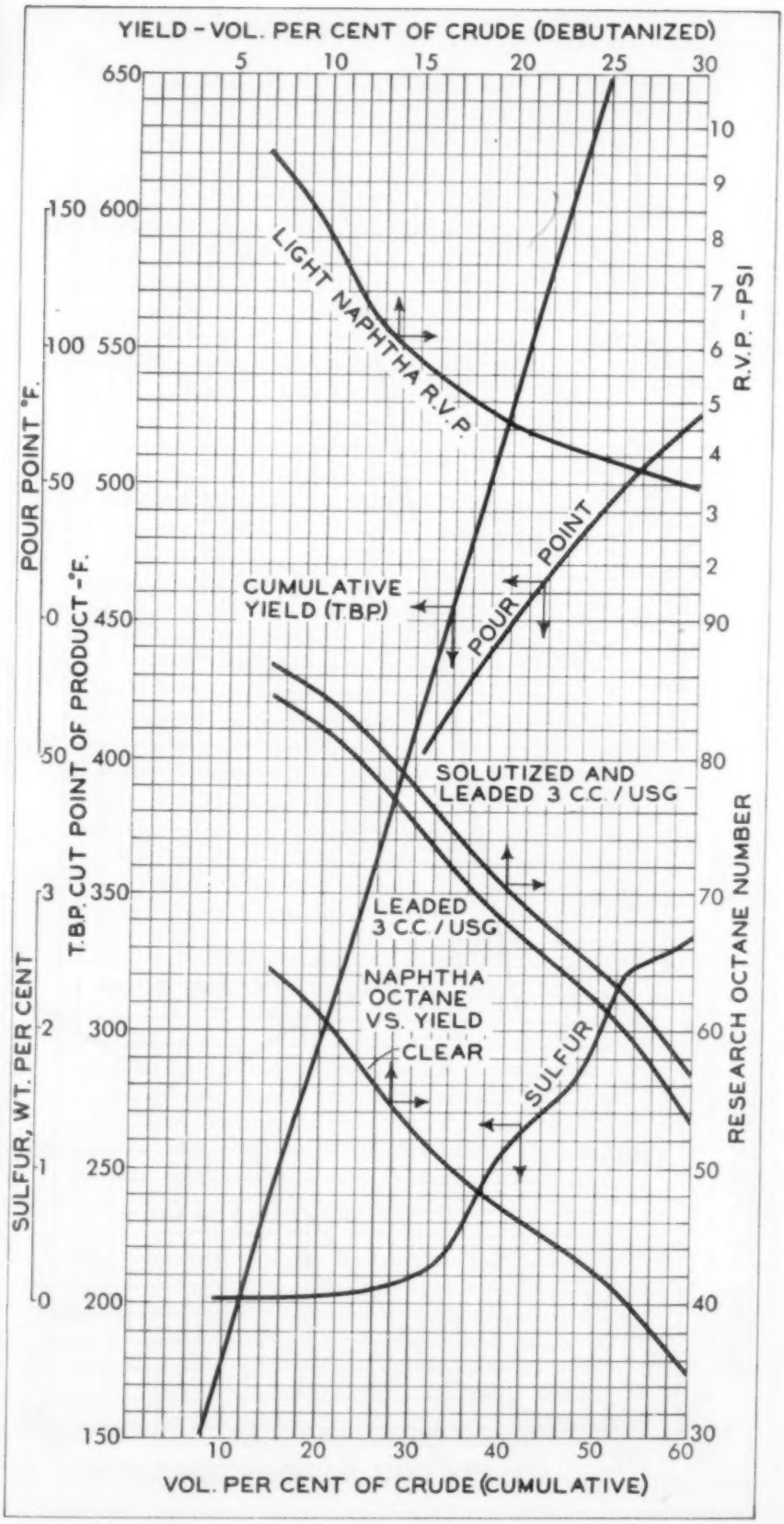
Wide-Range Gas Oil:
Yield, vol. %: 31.1
I.b.p., °F.: Approx. 680
E.p., °F.: Approx. 1,048
Sulfur, wt. %: 3.0
Gravity, °API: 21.7

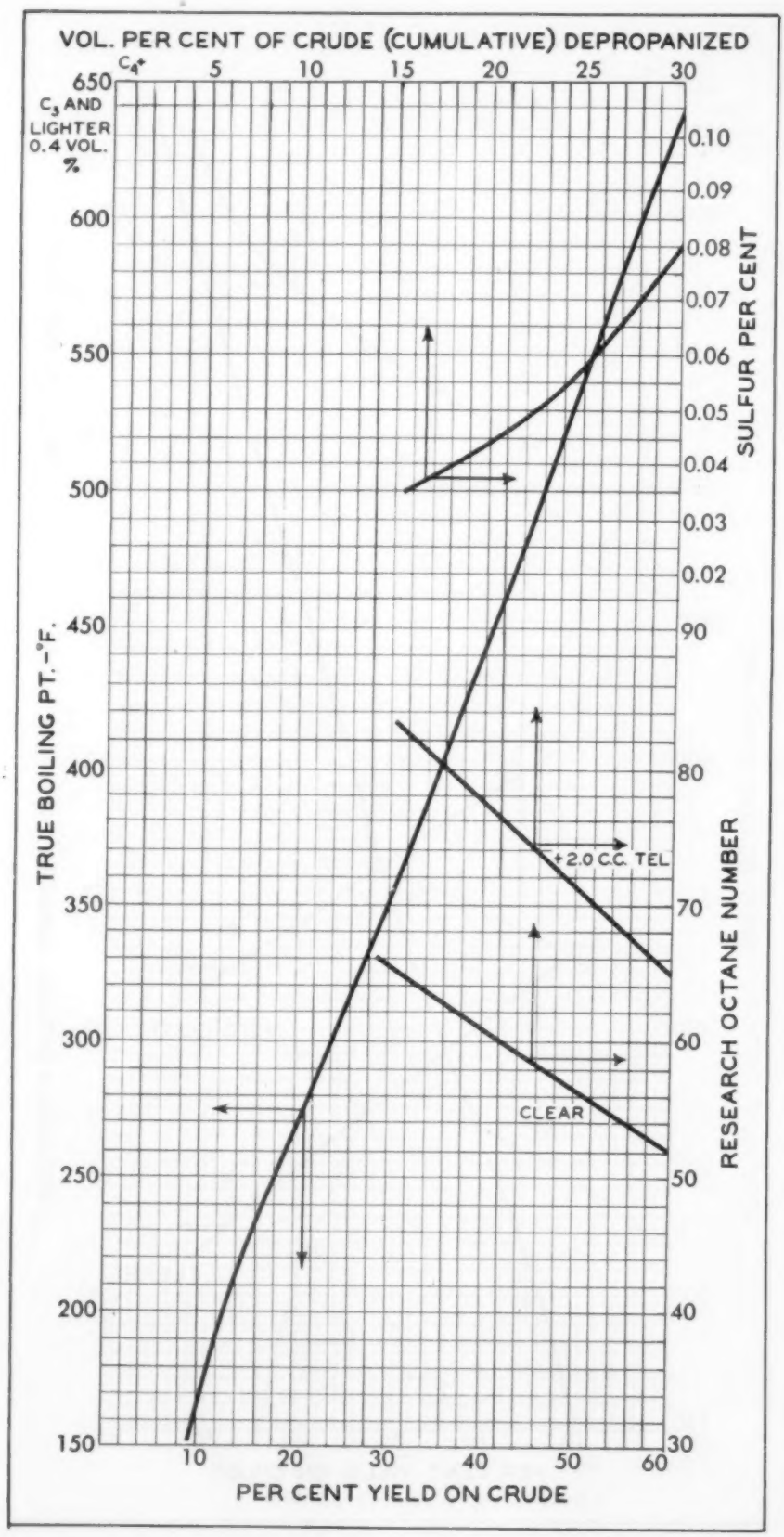
Heavy Fuel Oil:
Yield, vol. %: 50.0
Gravity, °API: 15.0
Sulfur, wt. %: 4.06
Ash, wt. %: 0.011
Viscosity, S.U.s. at 100° F.: 5,075
Viscosity, S.s.F. at 122° F.: 212

Asphalt: (85-100 penetration—above 1,065° F., TBP)
Yield, vol. %: 18.9
Gravity, °API: 5.1
Penetration at 77° F.: 90

Availability (prod., B/D): 1,500,000
Company: Gulf Exploration Co. and British Petroleum Co.

*$K = (TB)^{1/3}/S$





IRAQ-KIRKUK CRUDE

Crude:
Gravity, °API: 36.3
Sulfur, wt. %: 1.95
Viscosity S.U. at 100° F.: 41
Posted price: $2.49 2-3-58
F.o.b.: Tripoli-Banias

Light Naphtha:
Depropanized C_4 = 1.86%
Yield, vol. %: 18.1
E.p., °F.: 250
Gravity, °API: 77.7
Sulfur, wt. %: 0.040

Heavy Naphtha:
Yield, vol. %: 20.5
I.b.p., °F.: 250
E.p., °F.: 430
Gravity, °API: 49.5
Sulfur, wt. %: 0.175
Char. factor:* 11.85
Aromatics, vol. %: 17.1

Diesel Fuel:
Yield, vol. %: 39.1
I.b.p., °F.: 350
E.p., °F.: 750
Sulfur, wt. %: 1.02
Cetane No.: 56
Diesel index: 61
Viscosity S.U. at 100° F.: 37

Wide-Range Gas Oil:
Heavy
I.b.p., °F.: 650
E.p., °F.: 850
Sulfur, wt. %: 2.16
Pour pt., °F.: 80
Gravity, °API: 26.6

Heavy Fuel Oil (1,050° +)
Yield, vol. %: 12.6
Gravity, °API: 4.6
Sulfur, wt. %: 6.21
Pour pt., °F.: 120+
Viscosity S.F. at 275° F.: 215

Asphalt: (85-100 Penetration)
Yield, vol. %: 14.4
Gravity, °API: 5.75
Sp. gr.: 1.031
Penetration at 77° F.: 95
Viscosity S.F. at 275° F.: 137

Availability (Prod., B/D): 245,000
Principal producing companies: Iraq Petroleum Co., Ltd.

$°K = (TB)^{1/3}/S$
NOTE: All temperatures are true boiling.

BASRAH (ZUBAIR)

Crude:
Gravity, °API: 36.5
Sulfur, wt. %: 1.98
Viscosity S.U. at 100° F.: 42.5
Posted price: $1.98 (35° API) 2-3-58
F.o.b.: Fao

Light Naphtha:
Depropanized C_4 = 2.50%
Yield, vol. %: 17.7
E.p., °F.: 250
Gravity, °API: 79.3
Sulfur, wt. %: 0.009

Heavy Naphtha:
Yield, vol. %: 18.0
I.b.p., °F.: 250
E.p., °F.: 430
Gravity, °API: 50.8
Sulfur, wt. %: 0.05
Char. factor:* 11.95
Aromatics, vol. %: 7.0

Diesel Fuel:
Yield, vol. %: 35.8
I.b.p., °F.: 350
E.p., °F.: 750
Sulfur, wt. %: 1.15
Cetane No.: 57
Diesel index: 60
Viscosity S.U. at 100° F.: 37

Wide-Range Gas Oil:
Heavy
I.b.p., °F.: 650
E.p., °F.: 850
Sulfur, wt. %: 2.22
Pour pt., °F.: 70
Gravity, °API: 27.3

Heavy Fuel Oil (1,060° +)
Yield, vol. %: 14.7
Gravity, °API: 7.1
Sulfur, wt. %: 4.98
Pour pt., °F.: 120
Viscosity S.F. at 275° F.: 110

Asphalt: (85-100 Penetration)
Yield, vol. %: 12.9
Gravity, °API: 5.6
Sp. gr.: 1.032
Penetration at 77° F.: 95
Viscosity S.F. at 275° F.: 148

Availability (Prod., B/D): 190,000
Principal producing companies: Basrah Petroleum Co., Ltd.

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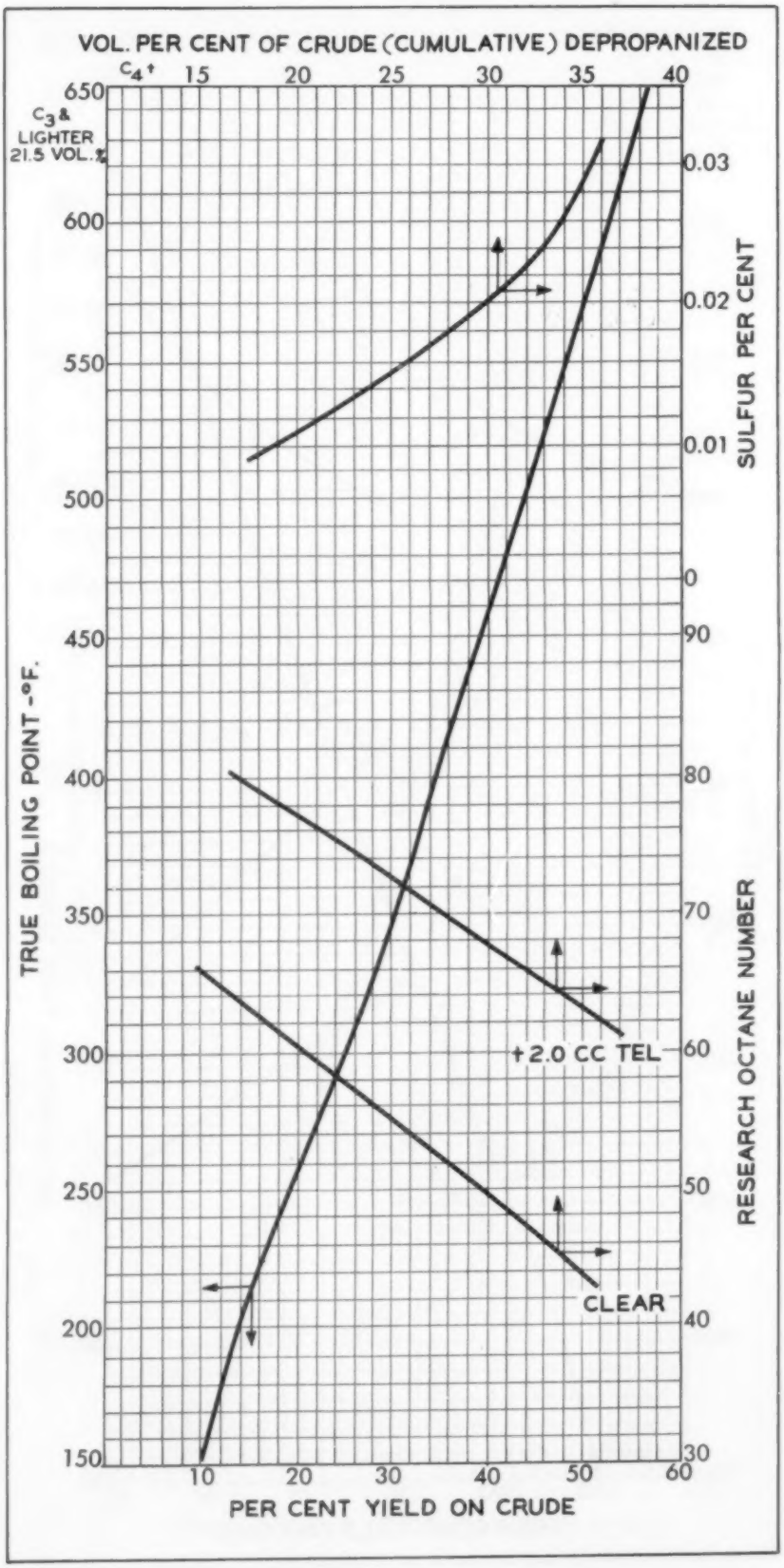
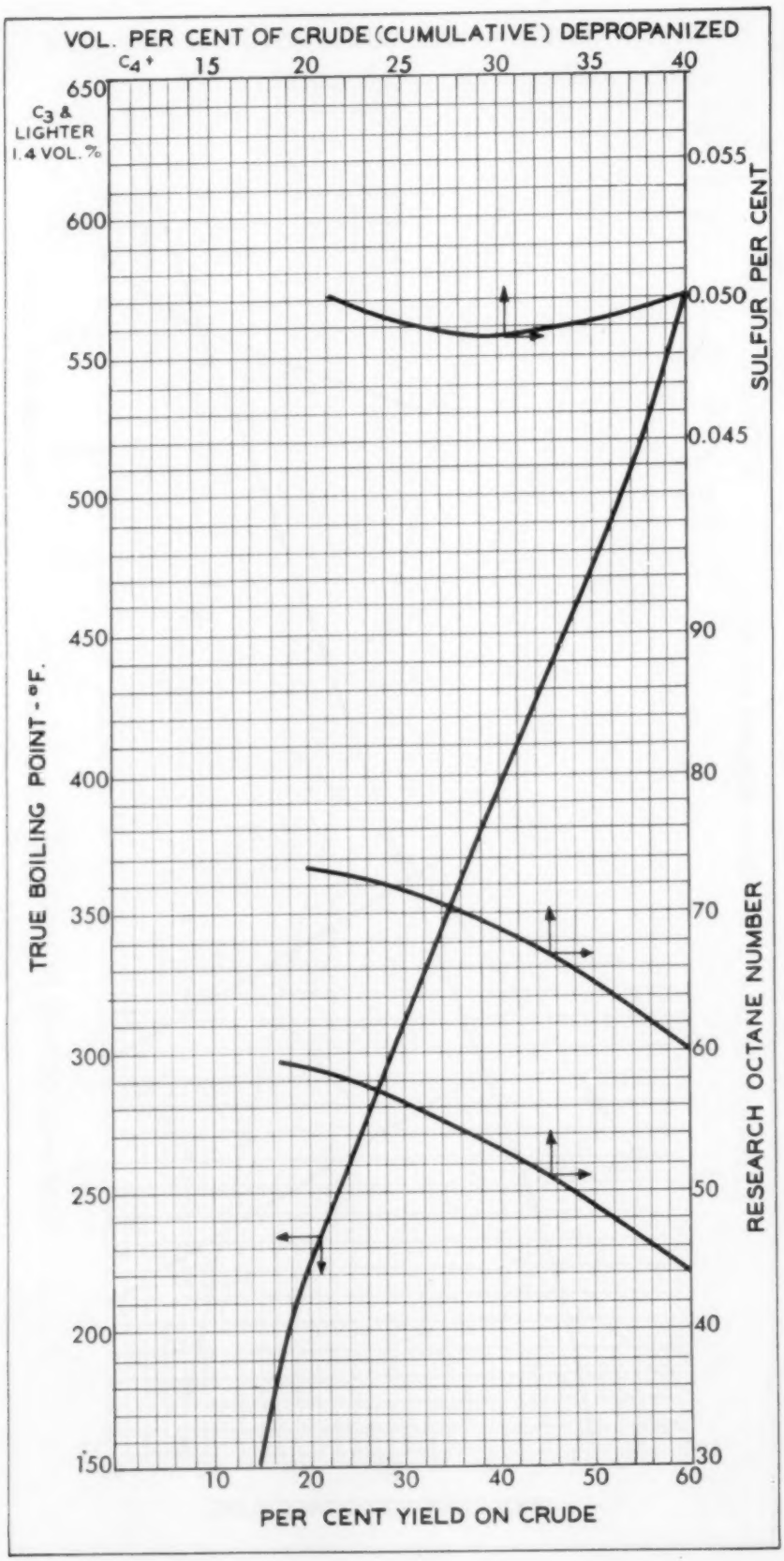
*$K = (TB)^{1/3}/S$
NOTE: All temperatures are true boiling.



QATAR CRUDE



Crude:
Gravity, °API: 41.0
Sulfur, wt. %: 1.27
Viscosity S.U. at 100° F.: 35.0
Posted price: $2.23, 2-3-58
F.o.b.: Umm Said

Light Naphtha
Depropanized $C_4 =$ 2.85%
Yield, vol. %: 21.5
E.p., °F.: 250
Gravity, °API: 77.5
Sulfur, wt. %: 0.050

Heavy Naphtha:
Yield, vol. %: 21.4
I.b.p., °F.: 250
E.p., °F.: 430
Gravity, °API: 50.2
Sulfur, wt. %: 0.05
Char. factor:* 11.9
Aromatics, vol. %: 20.0

Diesel Fuel:
Yield, vol. %: 41.8
I.b.p., °F.: 350
E.p., °F.: 750
Sulfur, wt. %: 0.92
Cetane No.: 58
Diesel index: 61
Viscosity S.U. at 100° F.: 36

Wide-Range Gas Oil: Heavy
I.b.p., °F.: 650
E.p., °F.: 850
Sulfur, wt. %: 1.96
Pour pt., °F. 75
Gravity, °API: 27.0

Heavy Fuel Oil: (1,045+)
Yield, vol. %: 7.2
Gravity, °API: 9.4
Sulfur, wt. %: 3.88
Pour pt., °F.: 90
Viscosity S.F. at 275° F.: 46

Availability (Prod., B/): 140,000
Principal producing companies: Qatar Petroleum Co., Ltd.

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*$K = (TB)^{1/3}/S$
NOTE: All temperatures are true boiling.

ARABIAN MIXTURE

Crude:
Type: Mixed base
Gravity, °API: 35.0
Sulfur, wt. %: 1.72
Viscosity S.U. at 100° F.: 43.0
Posted price:† $2.10 per bbl., 2-3-58
F.o.b.: Ras Tanura

Light Naphtha:
Depropanized C_4 = 1.54%
Yield, vol. %: 15.1
E.p., °F.: 250
Gravity, °API: 76.5
Sulfur, wt. %: 0.024

Heavy Naphtha:
Yield, vol. %: 16.4
I.b.p., °F.: 250
E.p., °F.: 400
Gravity, °API: 51.6
Sulfur, wt. %: 0.03
Char. factor:* 11.92
Naphthenes, vol. %: 18.5
Aromatics, vol. %: 16.1
Paraffins, vol. %: 62.7

Diesel Fuel:
Yield, vol. %: 39.6
I.b.p., °F.: 350
E.p., °F.: 750
Sulfur, wt. %: 0.97
Cetane No.: 56
Diesel index: 59
Viscosity S.U. at 100° F.: 37

Wide-Range Gas Oil: Heavy
I.b.p., °F.: 650
E.p., °F.: 850
Sulfur, wt. %: 2.05 pour pt., °F. 70
Gravity, °API: 26.4

Heavy Fuel Oil: (1,050°+)
Yield, vol. %: 12.0
Gravity, °API: 7.3
Sulfur, wt. %: 4.10
Pour pt., °F.: 120
Viscosity S.F. at 275° F.: 104

Availability (prod., B/D): 935,000
Principal producing companies: Aramco

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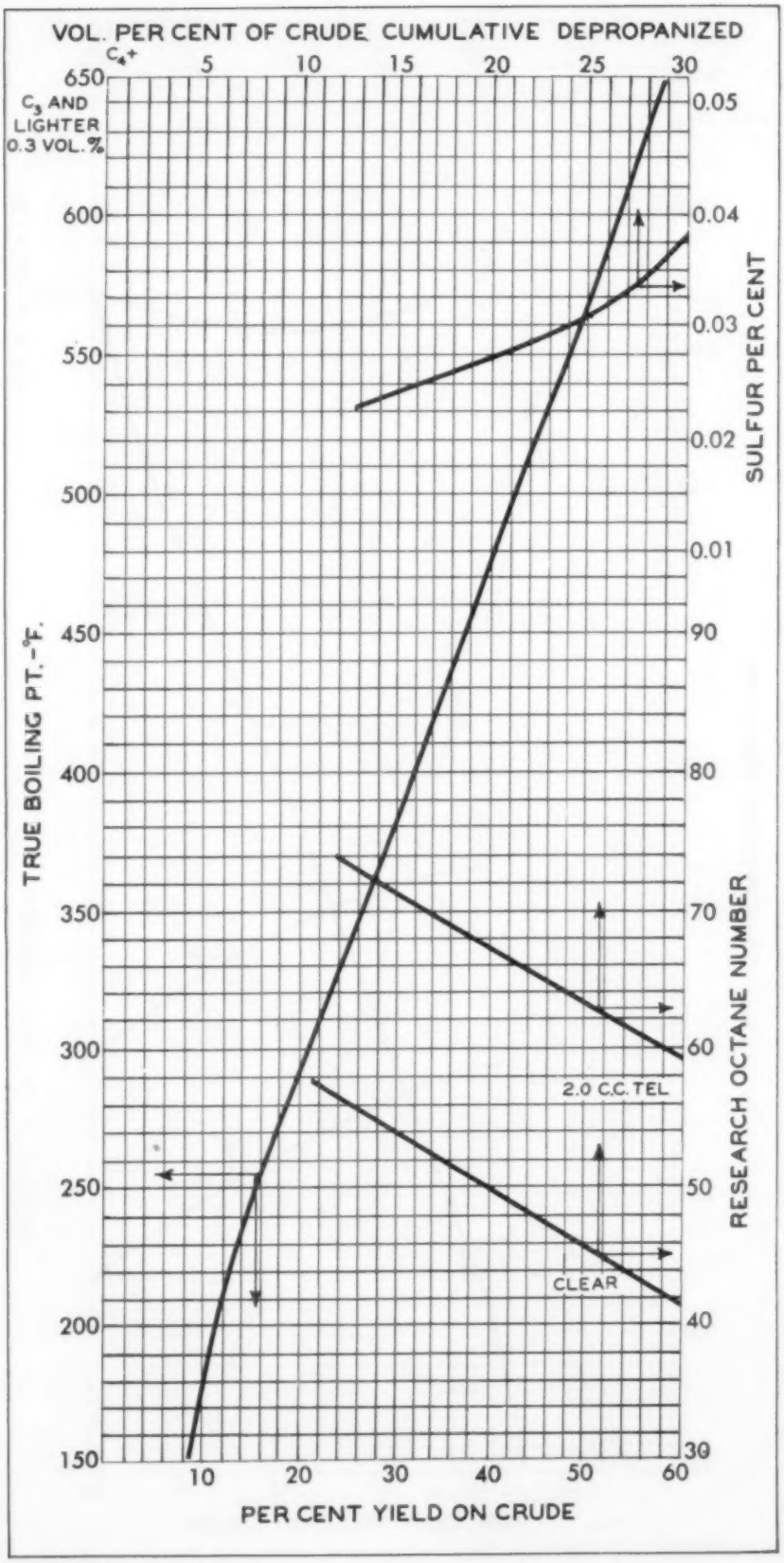
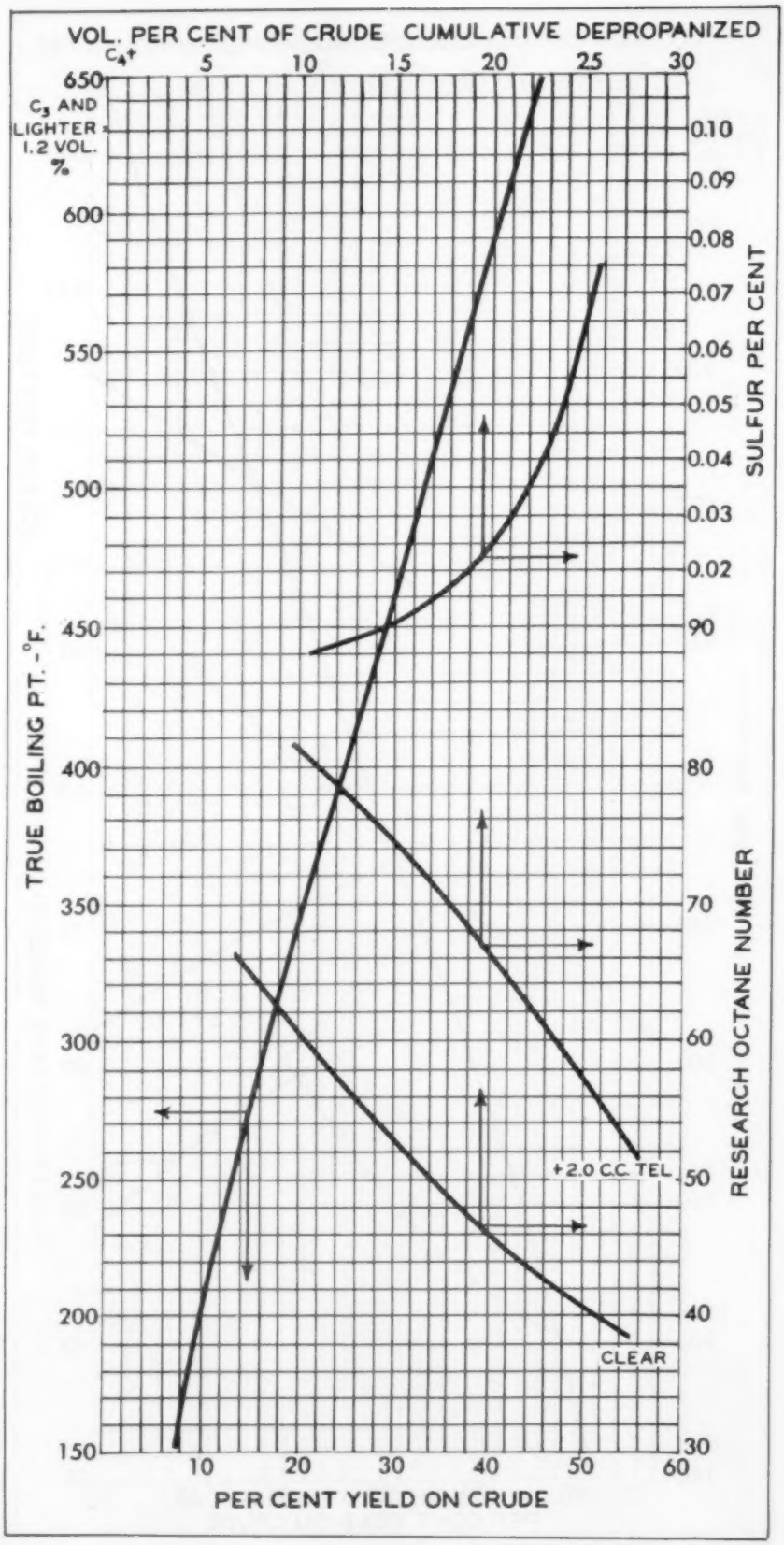
*$K = (TB)^{1/3}/S$
†$2.08 is posted price for 34° API at Ras Tanura and $2.45 at Sidon.
NOTE: All temperatures are true boiling.



SAFANIYA CRUDE



Crude:
Gravity, °API: 27.1
Sulfur, wt. %: 3.30
Viscosity S.U. at 100° F.: 138
Posted price: $1.79, 2-3-58
F.o.b.: Ras Tanura

Light Naphtha: (depropanized) C_4 = 1.46%
Yield, vol. %: 12.1
E.p., °F.: 250
Gravity, °API: 79.3
Sulfur, wt. %: 0.007

Heavy Naphtha:
Yield, vol. %: 13.7
I.b.p., °F.: 250
E.p., °F.: 430
Gravity, °API: 51.2
Sulfur, wt. %: 0.1
Char. factor:* 11.97
Aromatics, vol. %: 12.4

Diesel Fuel:
Yield, vol. %: 30.9
I.b.p., °F.: 350
E.p., °F.: 750
Sulfur, wt. %: 1.38
Cetane No.: 54
Diesel index: 57
Viscosity S.U. at 100° F.: 37

Wide-Range Gas Oil: Heavy
I.b.p., °F.: 650
E.p., °F.: 850
Sulfur, wt. %: 2.59; pour pt., °F. 75
Gravity, °API: 25.1

Heavy Fuel Oil: (1,040°+)
Yield, vol. %: 26.2
Gravity, °API: 2.3
Sulfur, wt. %: 5.9
Pour pt., °F.: 120+
Viscosity S.F. at 275° F.: 1,570

Asphalt: (85-100 Penetration)
Yield, vol. %: 35.1
Gravity, °API: 5.6; sp. gr.: 1.032
Penetration at 77° F.: 95
Viscosity S.F. at 275° F.: 206

Availability (Prod., B/D) 125,000 (rate at year end 1957)
Principal producing companies: Arabian American Oil Co. (Aramco)

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*$K = (TB)^{1/3}/S$
NOTE: All temperatures are true boiling.

IRANIAN-AGHA JARI

Crude:
Gravity, °API: 33.9
Sulfur, wt. %: 1.54
Viscosity S.U. at 100° F.: 45.5
Posted price: $1.99, 2-3-58 $2.04
F.o.b.: Abadan, Bandar Mashur

Light Naphtha:
Depropanized C_4 = 1.36%
Yield, vol. %: 15.0
E.p., °F.: 250
Gravity, °API: 72.5
Sulfur, wt. %: 0.100

Heavy Naphtha:
Yield, vol. %: 9.5
I.b.p., °F.: 200
E.p., °F.: 300
Gravity, °API: 57.7
Sulfur, wt. %: 0.10
Char. factor:* 11.91
Naphthenes, vol. %: 30.5
Aromatics, vol. %: 11.1
Paraffins, vol. %: 58.4

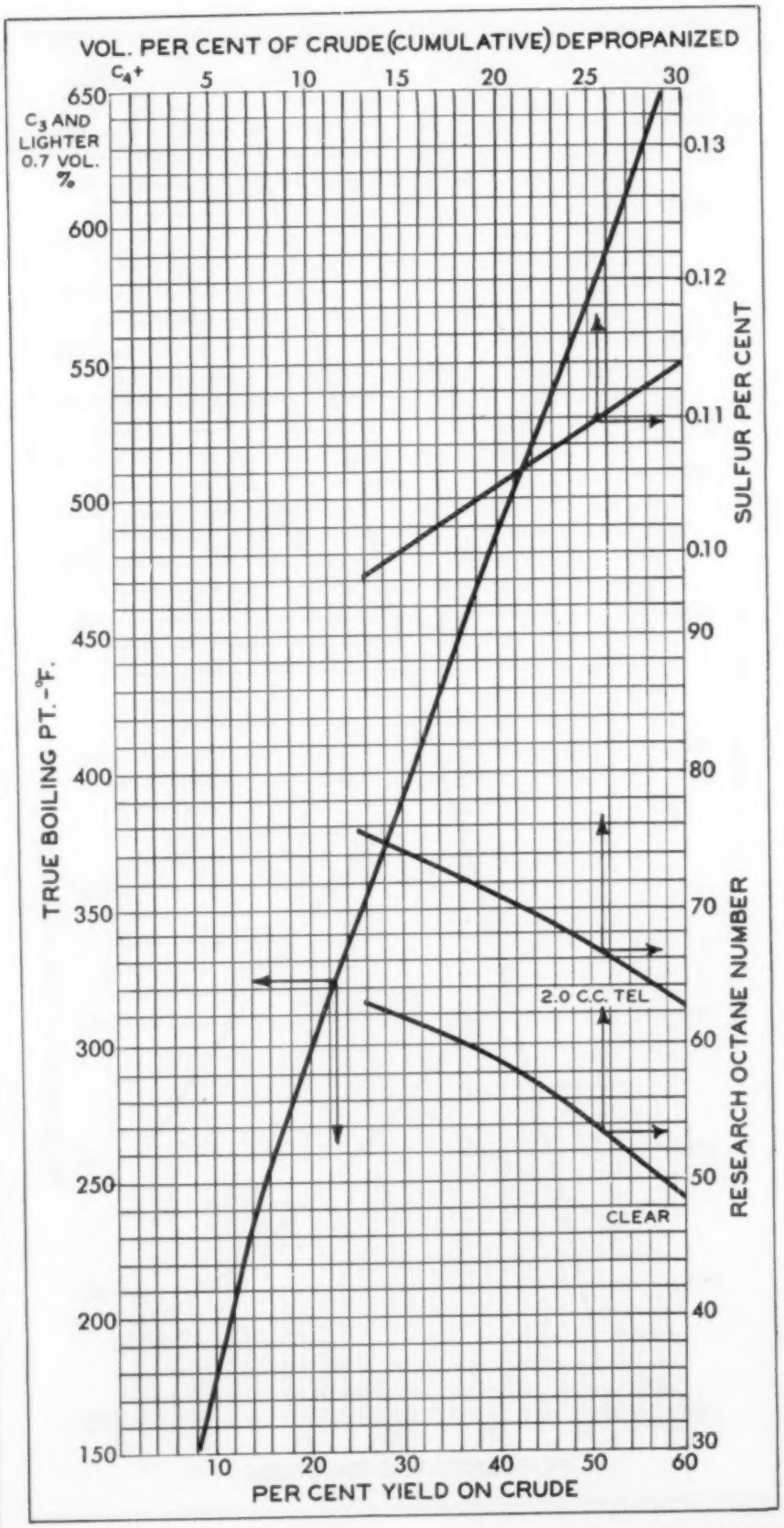
Diesel Fuel:
Yield, vol. %: 40.3
I.b.p., °F.: 350
E.p., °F.: 750
Sulfur, wt. %: 0.90
Cetane No.: 55
Diesel index: 58
Viscosity S.U. at 100° F.: 37

Wide-Range Gas Oil: Heavy
I.b.p., °F.: 650
E.p., °F.: 850
Sulfur, wt. %: 1.60 pour pt., °F. 75
Gravity, °API: 26.2

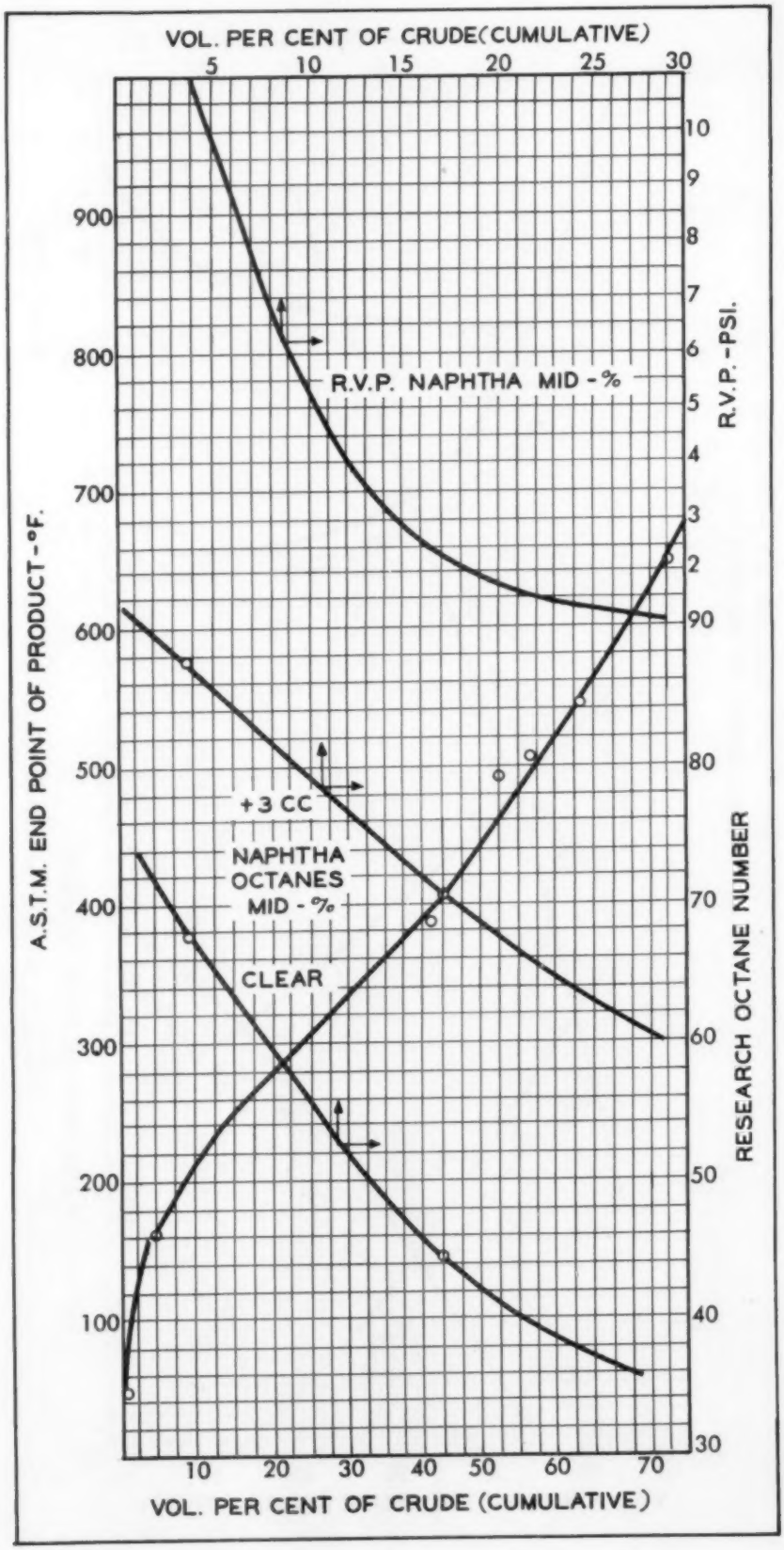
Heavy Fuel Oil: (1,035°+)
Yield, vol. %: 12.2
Gravity, °API: 6.4
Sulfur, wt. %: 3.82
Pour pt., °F.: 120+
Viscosity S.F. at 275° F.: 175

Availability (prod., B/D): 450,000
Principal producing companies: Iranian Consortium

*$K = (TB)^{1/3}/S$
NOTE: All temperatures are true boiling.



HASSI MESSAOUD



Crude:
Type: Intermediate
Gravity, °API: 41.1
Sulfur, wt. %: 0.16
Viscosity, S.U.s. at 100° F.: 34
R.v.p., psi.: 2.4

Light Naphtha:
Debutanized
Yield, vol. %: 4.9
E.p., °F.: 185
Gravity, °API: 83.2
Sulfur, wt. %: 0.004

Heavy Naphtha: 180°-330°
Yield, vol. %: 24.7
I.b.p., °F.: 175
E.p., °F.: 326
Gravity, °API: 60.3
Sulfur, wt. %: 0.006
Naphthenes, vol. %: 47.7
Aromatics, vol. %: 8.2
Paraffins, vol. %: 44.1

Heavy Naphtha: 330°-380°
Yield, vol. %: 8.2
I.b.p., °F.: 314
E.p., °F.: 381
Gravity, °API: 49.3
Sulfur, wt. %: 0.015
Naphthenes, vol. %: 45.5
Aromatics, vol. %: 17.0
Paraffins, vol. %: 37.3

Kerosine: 330°-500°
Yield, vol. %: 24.8
I.b.p., °F.: 340
E.p., °F.: 486
Gravity, °API: 45.1
Sulfur, wt. %: 0.04
Pour pt., °F.: Below 60
Diesel index: 62.9
Aromatics, %: 17.6

Gas Oil:
Yield, vol. %: 24.6
I.b.p., °F.: 508
E.p., °F.: 684
Sulfur, wt. %: 0.16
Gravity, °API: 33.2
Diesel index: 55.0

Resid.: (747° F.+)
Yield, vol. %: 20.5
Gravity, °API: 21.0
Sulfur, wt. %: 0.44
Pour pt., °F.: 30
Viscosity S.s.U. at 210°: 223
Carbon residue, %: 6.2

Companies: Societe Nationale de Recherches et d'Exploitation des Petroles en Algerie and Compagnie Francaise des Petroles (Algeria)

MINAS CRUDE

Type: Paraffinic
Gravity, °API: 35.8
Sulfur, wt. %: 0.06
Viscosity, S.s.U. at 100° F.: 82

Light Naphtha:
Debutanized
Yield, vol. %: 4.0
E.p., °F.: 225
Gravity, °API: 74
Sulfur, wt. %: 0.01

Heavy Naphtha:
Yield, vol. %: 13.8
I.b.p., °F.: 225
E.p., °F.: 390
Gravity, °API: 57
Sulfur, wt. %: 0.01
Char. factor:* 12.0
Naphthenes, vol. %: 33
Aromatics, vol. %: 4
Paraffins, vol. %: 63

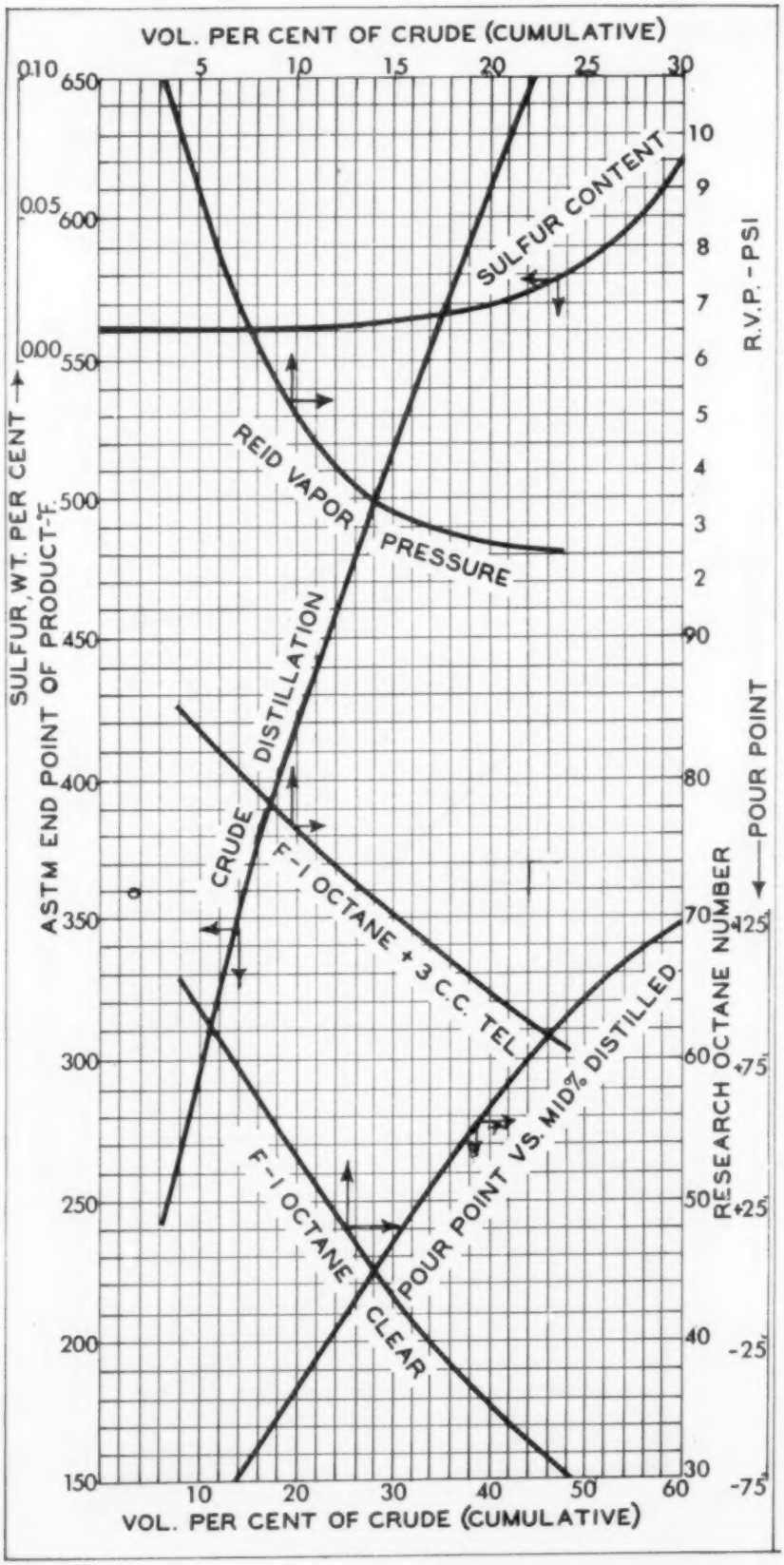
Diesel Fuel:
Yield, vol. %: 21.4
I.b.p., °F.: 400
E.p., °F.: 620
Sulfur, wt. %: 0.03
Cetane No.: 69
Diesel index: 70
Viscosity, S.s.U. at 100° F.: 35.5

Wide-Range Gas Oil:
I.b.p., °F.: 450
E.p., °F.: 724
Sulfur, wt. %: 0.03
Gravity, °API: 39.4

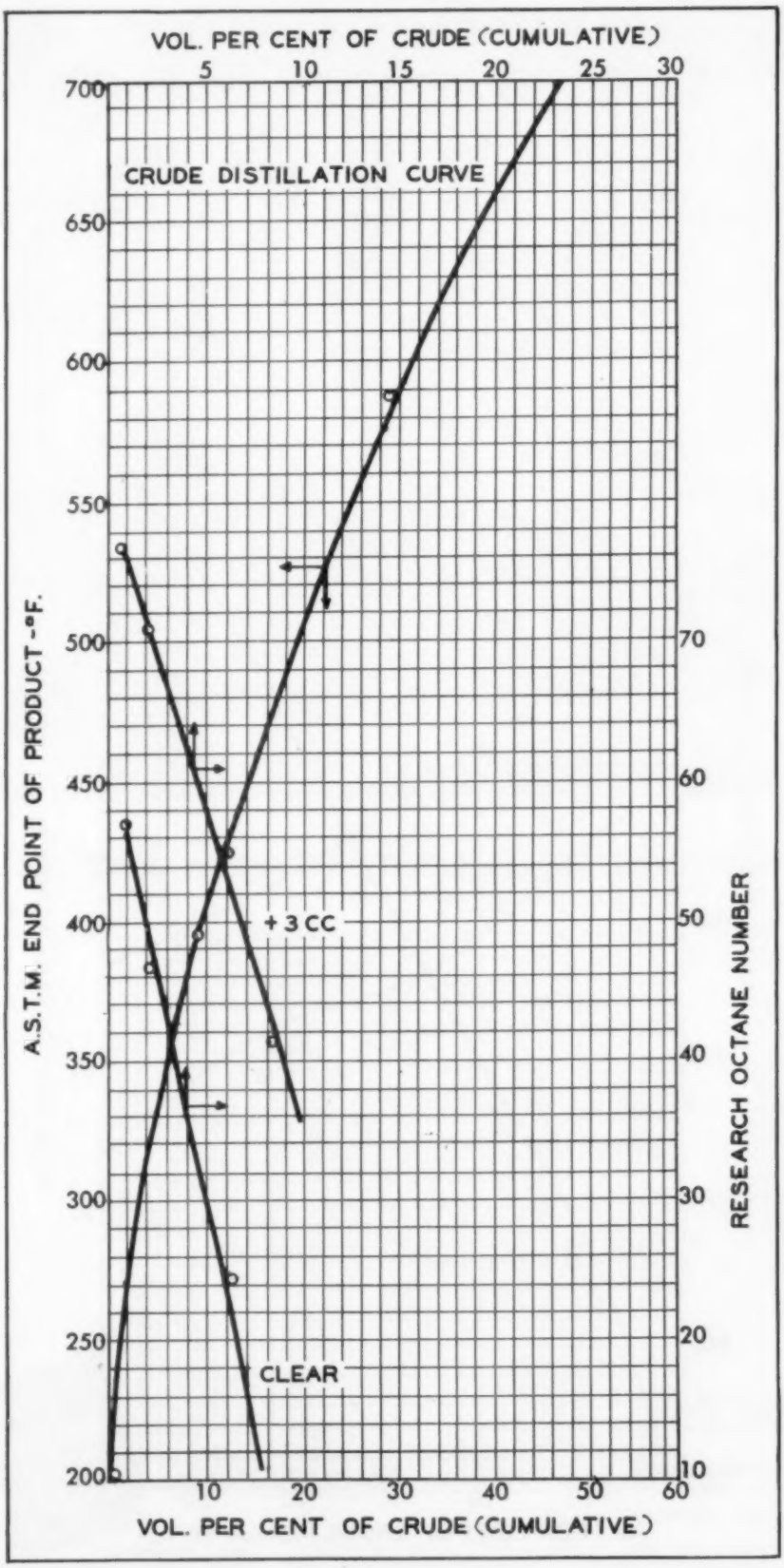
Heavy Fuel Oil:
Yield, vol. %: 59
Gravity, °API: 27
Sulfur, wt. %: 0.1
Viscosity, S.s.U. at 130° F.: 350

Availability, B/D: 180,000
Company: Caltex Pacific Oil Co.

*$K = (TB)^{1/3}/S$



LIRIK SUMATRA



Crude:
Type: Paraffin intermediate
Gravity, °API: 35.6
Sulfur, wt. %: 0.08
Viscosity, S.s.U. at 130° F.: 65.3
Pour pt., °F.: 105

Light Naphtha:
Debutanized
Yield, vol. %: 5.0
E.p., °F.: 296
Gravity, °API: 65
Sulfur, wt. %: 0.037
R.v.p., psi.: 2.4

Whole Naphtha:
Debutanized
Yield, vol. %: 12.1
I.b.p., °F.: 160
E.p., °F.: 388
Gravity, °API: 58.5
Sulfur, wt. %: 0.03
R.v.p., psi.: 0.08

Kerosine:
Yield, vol. %: 8.9
I.b.p., °F.: 354
E.p., °F.: 486
Gravity, °API: 46.7
Sulfur, wt. %: 0.017
Flash, Tag: 126
Smoke pt., mm.: 30
Viscosity, S.s.U. at 100° F.: 30.2

Light Gas Oil:
Yield, vol. %: 13.3
I.b.p., °F.: 480
E.p., °F.: 567
Sulfur, wt. %: 0.087
Gravity, °API: 39.3
Diesel index: 64.2
Cetane No.: 56.5
Viscosity, S.s.U. at 100° F.: 35.4

Reduced Crude:
Yield, vol. %: 65.7
Gravity, °API: 30.1
Sulfur, wt. %: 0.15
Pour pt., °F.: 115
Viscosity, S.s.U. at 130° F.: 268
Carbon residue, %: 3.4

Availability, B/D: 11,000
Company: Standard-Vacuum Oil Co.

SERIA CRUDE

Crude:
Type: Light
Gravity, °API: 37.7
R.v.p., psi.: 4.1
Sulfur, wt. %: 0.04
Kin. viscosity, cs.: 2.07
Posted price: $2.75
F.o.b.: Lutong, Sarawak

Light Naphtha:
Debutanized
Yield, vol. %: 6.50
E.p., °F.: 190
R.v.p., psi.: 9.0
Gravity, °API: 71.5
Sulfur, wt. %: nil

Heavy Naphtha: 185°-311°
Yield, vol. %: 19.47
I.b.p., °F.: 221
E.p., °F.: 298
Gravity, °API: 51.6
Sulfur, wt. %: nil
Naphthenes, vol. %: 54
Aromatics, vol. %: 18
Paraffins, vol. : 28

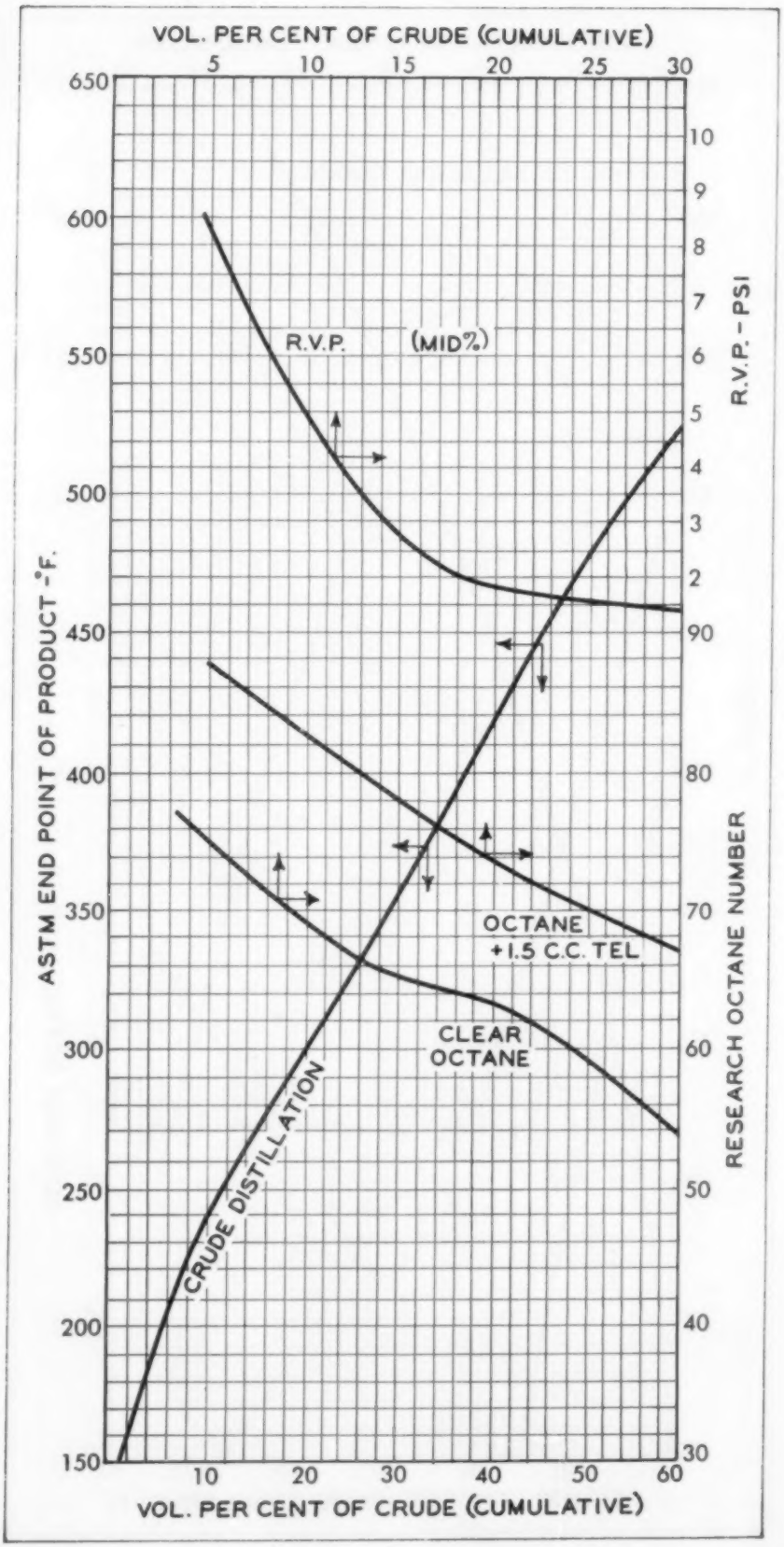
Heavy Naphtha: 311°-374°
Yield, vol. %: 9.1
I.b.p., °F.: 325
E.p., °F.: 356
Gravity, °API: 44.3
Sulfur, wt. %: nil
Naphthenes, vol. %: 51
Aromatics, vol. %: 31
Paraffins, vol. %: 18

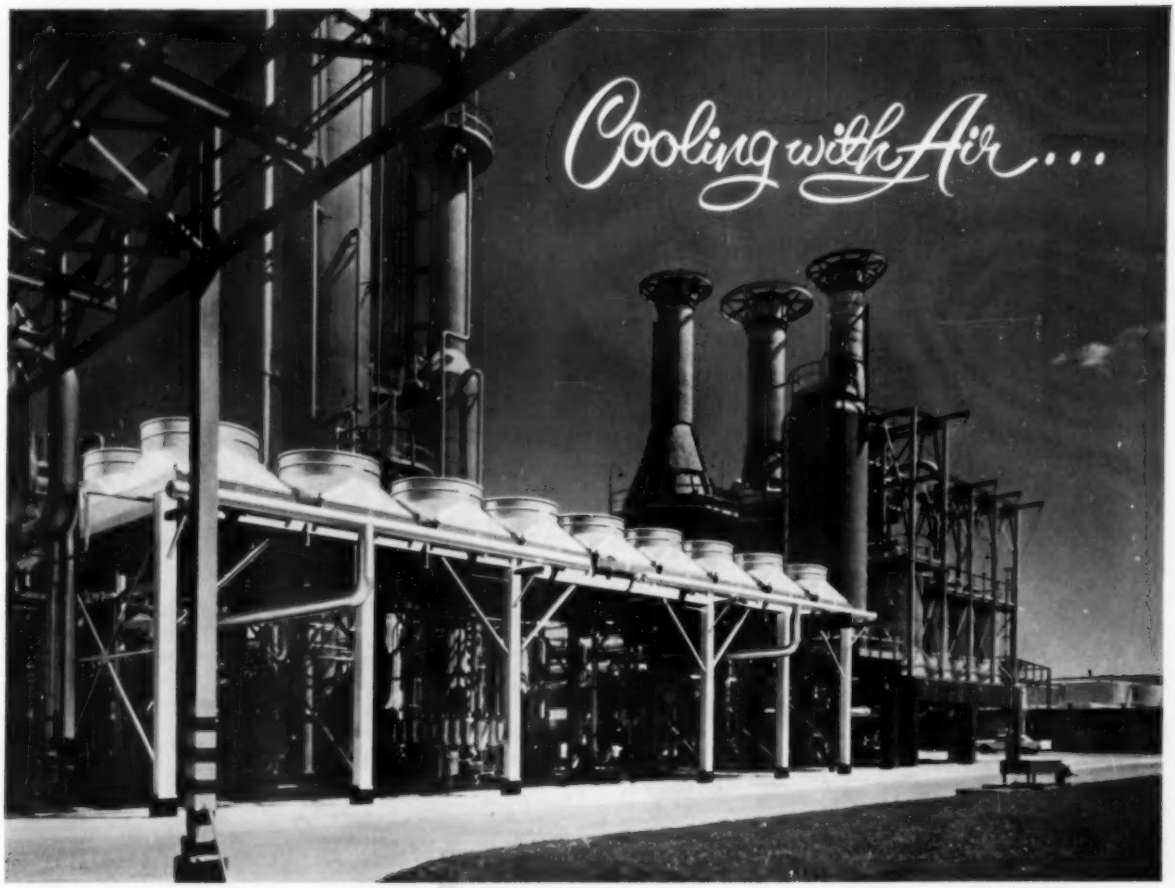
Kerosine:
Yield, vol. %: 25.1
Gravity, °API: 40.2
I.b.p., °F.: 347
E.p., °F.: 453
Smoke pt., mm.: 17
Sulfur, wt. %: 0.01
Freeze pt., °F.: —65
Flash pt. (F. M.cc.): 136
Kin. viscosity at 0° F., cs.: 4.06

Wide-Range Gas Oil:
Yield, vol. %: 33.1
I.b.p., °F.: 487
E.p., °F.: 675
Sulfur, wt. %: 0.94
Gravity, °API: 30.4

Residuum: (700°+)
Yield, vol. %: 17.2
Gravity, °API: 21.2
Sulfur, wt. %: 0.15
Con. carbon, wt. %: 1.6
Viscosity, S.U.s. at 210° F.: 63

Availability, B/D: 115,000
Company: Brunei Shell Petroleum Co.





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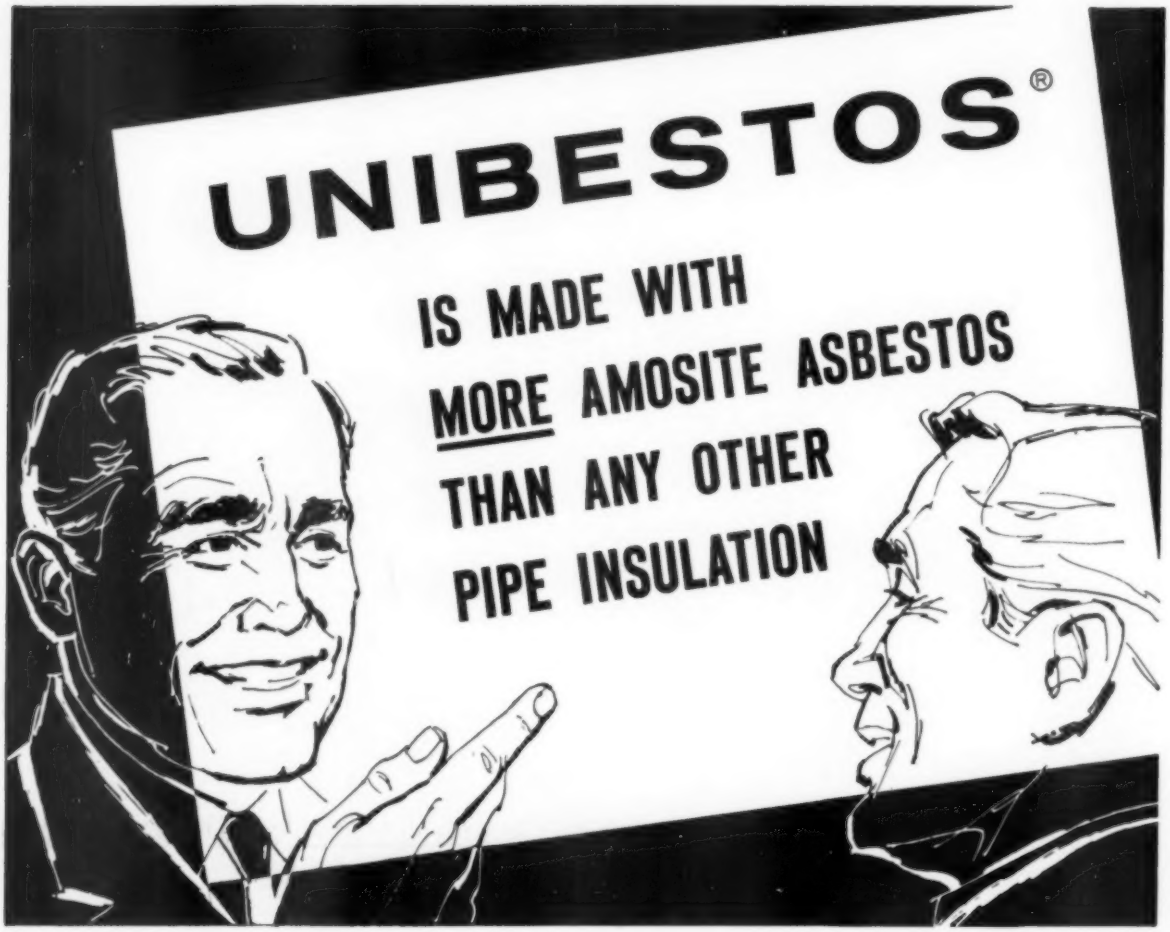

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Journal Survey of Refineries in United States

Location and Capacities as of January 1, 1958

State—	No. plants	Crude capacity B.P.C.D.	Crude capacity B.P.S.D.	Charge, bbl. per stream day: Vacuum dist.	Thermal operations	Catalytic cracking, total feed	Catalytic reforming	Hydro-treating	Production, bbl. per stream day: Alkylation	Polymerization	Lubes	Coke (tons)	Asphalt*: (1)	(2)	(3)	(1-2-3)
Alabama	4	14,000	15,500	8,400									8,080	1,650	2,300	
Arkansas	6	78,900	82,800	25,800	13,000	39,000	12,240	12,500	2,750	900	3,900	400	5,300	1,600		
California	36	1,244,030	1,338,400	567,000	548,900	433,000	189,500	174,325	43,500	4,395	23,060	3,540	56,325	12,335	7,500	
Colorado	7	35,000	37,500	5,200	15,100	12,400	4,150			1,100			1,200			
Delaware	2	123,500	133,700	85,500	42,000	102,000	45,000	88,000	5,000	5,100		1,200				1,700
Florida	1	2,000	2,000										1,000	500		
Georgia	1	6,500	7,000										3,800	1,500		
Illinois	13	543,400	569,300	144,500	143,600	258,050	116,300	122,700	27,300	10,418	4,400	1,700	19,350	1,700	1,800	5,700
Indiana	10	465,800	481,750	103,300	175,500	177,100	100,650	82,400	10,260	4,250	10,750	1,370	11,100	4,500	2,500	
Kansas	14	307,000	327,600	78,700	54,500	179,000	55,200	6,200	4,600	9,150	3,600	485	17,900	1,520	890	
Kentucky	4	100,040	106,500	32,800	10,240	42,550	8,400	11,000		4,325			6,000	9,500	2,000	
Louisiana	13	790,900	825,200	219,315	114,600	464,200	72,350		43,200	11,580	12,183	725	16,103	900	1,800	
Maryland	3	33,500	39,500	19,500	6,000								16,500	3,900	4,300	
Massachusetts	1	50,000	55,000	13,100		30,000	7,200	7,200		1,800			4,900	5,100		
Michigan	15	159,300	171,500	42,000	30,900	59,800	29,200	27,900		3,630		300	12,500	600		
Minnesota	4	60,900	65,300	11,500	10,000	42,000	7,800	18,800		1,770		550				
Mississippi	3	21,150	22,200	5,100	6,800	25,700	2,500	1,200	2,500			225	2,250	1,800	1,800	
Missouri	1	76,100	80,000	7,200	56,000	40,000	14,000	20,000	3,800	1,800		505		1,100	2,700	
Montana	11	73,990	80,825	20,775	18,850	49,500	6,600	15,300		2,370		210	10,805		225	
Nebraska	2	3,235	3,400		1,100		650									
New Jersey	6	442,300	467,200	206,600	63,800	222,400	69,300	114,400	16,930	9,800	8,700		17,000	4,900	1,300	
New Mexico	6	28,480	31,100	4,980	3,475	8,080	5,410	680	1,650	465			2,100			
New York	5	106,000	112,800	19,300	8,000	56,000	16,500	19,000	3,000	1,850	2,500		3,630	4,950		
North Dakota	2	36,650	39,500		1,000	23,000	6,200			4,365						
Ohio	12	397,400	427,700	91,900	106,200	210,800	74,800	37,000	7,500	8,070	4,600	650	16,200	13,100	4,000	
Oklahoma	14	380,995	396,300	117,800	82,500	212,565	60,480	29,900	13,300	9,600	11,150	1,230	5,800	§5,000	1,000	
Oregon	1	3,500	6,500	6,500									4,200	900	1,150	
Pennsylvania	13	645,250	679,195	208,200	84,000	317,320	108,000	81,400	20,500	8,130	29,850		9,200	2,200		
Rhode Island	2	9,500	10,000	1,800									4,000			1,700
South Carolina	1	8,000	8,700	6,800									4,350	250		
Tennessee	2	11,700	12,800	5,000		5,000				400						
Texas	54	2,445,230	2,607,330	602,200	555,900	993,000	441,500	409,700	97,150	29,350	68,990	500	29,725	1,500	2,400	12,900
Utah	6	88,865	93,000	30,700	8,500	48,000	12,500	1,000	3,500	1,100	120		2,000		1,200	
Virginia	1	33,000	35,000	19,000	9,600	30,600	7,600	22,600		2,500		600				
Washington	5	105,000	115,000	33,500	8,600	53,000	26,000	11,000		5,300			6,100	2,100		
West Virginia	2	6,571	7,300	2,000	2,150		2,500	500		155	1,600					
Wisconsin	2	17,000	18,000	5,800	1,500		2,500	3,000					3,280			
Wyoming	11	110,025	119,225	45,750	20,050	46,000	15,900	16,460	2,500	2,200	760	218	11,600	1,050	2,000	1,600
Puerto Rico	2	65,725	72,300	43,500		66,100	7,460	7,460	1,425	3,000						
Total	298	9,130,436	9,703,925	2,841,020	2,202,355	4,246,165	1,528,390	1,341,625	310,365	148,873	186,163	14,408	312,298	§84,155	40,865	23,600

*Asphalt is reported thus: (1) straightrun; (2) oxidized; (3) other; (1-2-3) combined straightrun, oxidized, and other. §Includes 2,500 bbl. combined (1) and (2).

Measuring gas temperatures in an engine combustion chamber by *radar*. This technique depends upon the relationship between the velocity of sound in a gas and the temperature of the gas.

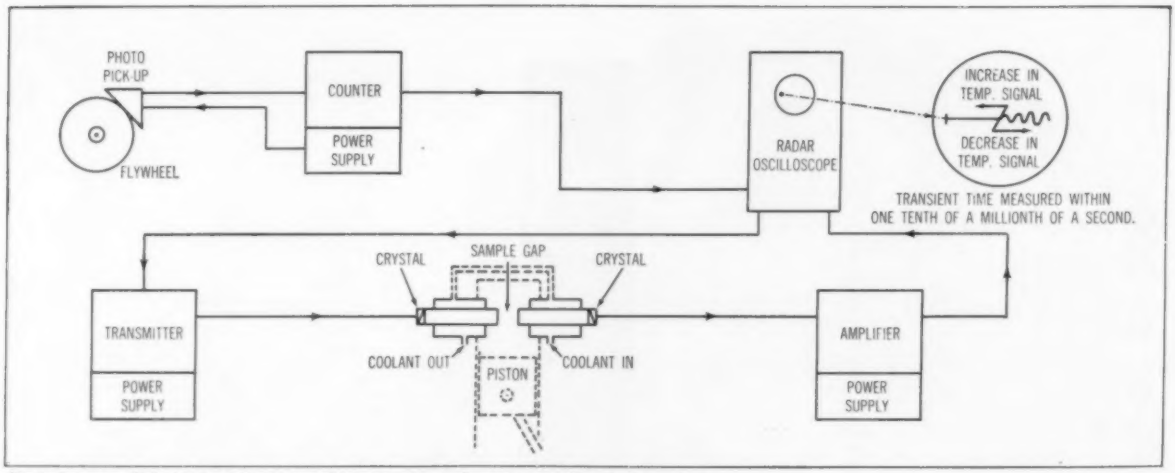
Ethyl Research Uses New Technique to Measure Combustion Temperatures

"Nearly all the grandest discoveries of science have been but the rewards of accurate measurements..."

—Sir William Thomson (Lord Kelvin), 1824-1907

Inability to measure the temperatures of the burning gases in an automotive engine has long impeded understanding of combustion phenomena.

Such measurements are a problem primarily because they involve time durations as short as millionths of a second. Even the most sensitive temperature-sensing devices generally are too slow for such work.



Block diagram of electronic equipment used in measuring end gas temperatures in an engine.

Method Developed at Massachusetts Institute of Technology

Recently, scientists at the Massachusetts Institute of Technology, in a research program supported by the Coordinating Research Council and the Office of Ordnance Research, developed an ingenious solution to the problem.

The solution of the M.I.T. scientists is based on the classical thermodynamic relationship between the velocity of sound in a gas, the properties of the gas, and its temperature.

Calculations Check With Latest Theories

Ethyl Research, the first industrial laboratory to adopt this new method of temperature measurement, has found that the technique yields highly reproducible results.

Ethyl scientists also have determined that temperatures indirectly measured by the velocity of sound method check closely with calculations based on the latest theoretical concepts.

The mathematical expression of the relationship between temperature and the velocity of sound in a perfect gas is the equation

$$V^2 = \frac{(Cp/Cv)RT}{M}$$

where **M** = molecular weight of the gas
Cv = specific heat of the gas at constant volume
Cp = specific heat at constant pressure
R = universal gas constant
V = velocity of sound in the gas at the absolute temperature, **T**

Since present knowledge of combustion provides answers for the specific heats and the molecular weight, measurement of the velocity of sound permits calculation of the gas temperature.

Radar Measures Sound Velocity

The M.I.T. method that was adopted by Ethyl Research people is to send a precise sound pulse—a 2,000,000-cycle-per-second vibration—from one side of the engine's combustion chamber to the other.

Then a radar oscilloscope and associated electronic equipment measure accurately the amount of time taken by the sound to cross the chamber.

Additional electronic equipment triggers the sound at any given instant in the engine cycle, thus permitting temperatures to be calculated throughout the cycle.

This new research tool opens the way to important new discoveries in the field of basic combustion. It also should prove valuable in furthering our knowledge of the mechanism of knock and antiknock action.

How Ethyl Research is helping you

By keeping constantly alert to new techniques and advances in scientific knowledge, Ethyl Research people supplement their own technology to expand the ever-widening knowledge of fuels, engines, and combustion.

Ethyl Technical Representatives are available at all times to give your technical people access to the great store of information developed in years of specialized fuel-engine research.

For further information, just call your Ethyl Representative. He will welcome the opportunity to arrange an appointment for you with one of our Technical Representatives.

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New York 17, N. Y.

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RESEARCH LABORATORIES:
1600 W. Eight Mile Road, Ferndale 20, Mich.
2600 Cajon Road, San Bernardino, Calif.

Where the plants are, their capacities, and types of processing

Processes in table are identified by numbers:

CATALYTIC CRACKING AND PER CENT RECYCLE
(Per cent recycle based on total feed)
1. Fluid
2. Thermofor
3. Houdriflow
4. Houdry
5. Cycloversion

THERMAL PROCESSES
1. Gas Oil Cracking
2. Visbreaking
3. Naphtha Reforming
4. Fluid Coking
5. Delayed Coking
6. Batch Coking
7. Polyforming
8. Cracking, General
9. Residuum Cracking

CATALYTIC REFORMING
1. Platforming
2. Fluid Hydroforming
3. Fixed Bed Hydroforming
4. Houdriforming
5. Ultraforming
6. Catforming
7. Thermofor
8. Sinclair-Baker
9. Socony
10. Powerforming
11. Rexforming
12. Iso-Plus
13. Hyperforming
14. Cycloversion
15. Undefined

CATALYTIC HYDROGENATION
1. Unifining
2. Esso Hydrofining
3. Indiana Hydrofining
4. Hydrotreating
5. Gulfining
6. Socony
7. Houdry
8. Shell Vapor Phase
9. Shell Trickle
10. Diesulforming
11. Sinclair
12. Kellogg
13. Platreating
14. Own
15. Undefined

ALKYLATION
1. Sulfuric acid
2. Hydrofluoric acid

ASPHALTS
1. Straightrun
2. Oxidized
3. Other

POLYMERIZATION
1. Thermal
2. Catalytic

Note: In converting crude-capacity figures from stream day to calendar day, a factor of 0.95 was used; for process figures, a factor of 0.90 was used.

Footnote Legend:
*Barrels per calendar day.
†State totals include crude capacities not reported and calendar-day figures converted to stream-day basis.
‡Not reported.
¶Asphalt totals.

Company and location	Crude capacity B.P.C.D.	Crude capacity B.P.S.D.	Charge, bbl. per stream day: Vacuum dist.	Thermal operations	Cat cracking: Total feed	Cat cracking: Per cent recycle	Catalytic reforming	Hydro. treating	Production, bbl. per stream day: Alkylation	Polymerization	Lubes	Coke (tons)	Asphalt
Alabama													
American Bitumuls & Asphalt Co.:													
Mobile (Blakely Island)	5,000	6,000	6,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	[1]4,800 [2]900 [3]2,300
Hunt Oil Co.:													
Tuscaloosa	6,000	6,000	2,400	.....	.....	.....	.....	.....	.....	.....	.....	.....	[1]1,600 [2]400
Vulcan Asphalt Refining Co.:													
Cordova	1,800	2,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	[1]1,080
Warrior Asphalt Corp.:													
Holt	1,200	1,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	[1]600 [2]350
Total	14,000	15,500	8,400	.....	.....	.....	.....	.....	.....	.....	.....	.....	(¶)

¶Asphalt totals: (1) 8,080; (2) 1,650; (3) 2,300.

Company and location	Crude capacity B.P.C.D.	Crude capacity B.P.S.D.	Charge, bbl. per stream day: Vacuum dist.	Thermal operations	Cat cracking: Total feed	Cat cracking: Per cent recycle	Catalytic reforming	Hydro. treating	Production, bbl. per stream day: Alkylation	Polymerization	Lubes	Coke (tons)	Asphalt
Arkansas													
American Oil Co.:													
El Dorado	38,400	40,000	20,000	[1]3,000 [5]10,000	[1]21,500	20.0	[5]12,240	[3]12,500	[2]1,500	[2]500	.....	400	.....
Berry Asphalt Co. of Arkansas:													
Stephens	1,800	2,000	1,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	[1]600
Waterloo	1,000	1,300	1,100	.....	.....	.....	.....	.....	.....	.....	500	.....	[1]600

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The Tenamene line includes every principal type of gum inhibitor in commercial use today.

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SALES OFFICES: **Eastman Chemical Products, Inc.**, Kingsport, Tennessee; New York City; Framingham, Mass.; Cincinnati; Cleveland; Chicago; St. Louis; Houston.
West Coast: Wilson Meyer Co., San Francisco; Los Angeles; Portland; Salt Lake City; Seattle.

REFINERY SURVEY (ARKANSAS Continued)

Company and location—	Crude capacity B.P.C.D.	Crude capacity B.P.S.D.	Charge, bbl. per stream day: Vacuum dist.	Thermal operations	Cat cracking: Total feed	Cat cracking: Per cent recycle	Catalytic reforming	Hydro. treating	Production, bbl. per stream day: Alkylation	Polymerization	Lubes	Coke (tons)	Asphalt
Cross, Henry H., Co.:													
Smackover	6,000	6,300	1,200	.....	.....	.....	.....	.....	.....	.....	700	.....	[1]700
Lion Oil Co., Div. Monsanto Chemical Co.:													
El Dorado	28,000	29,000	.....	.....	[1]11,000 [2]6,500	45.0	.....	.....	[1]1,250	[2]400	1,000	.....	[1]3,400 [2]500
Macmillan Petroleum Corp.:													
Norphlet	3,700	4,200	2,500	.....	.....	.....	.....	.....	.....	.....	1,700	.....	[2]1,100
Total	78,900	82,800	25,800	13,000	39,000	.....	12,240	12,500	2,750	900	3,900	400	(¶)

¶Asphalt totals: (1) 5,300; (2) 1,600.

California

Bankline Oil Co.:													
Bakersfield	11,400	12,000	.....	[1]3,000 [4]4,000	.....	.....	.....	.....	[1]1,000	.....	.....	20	.....
Caminol Co.:													
Hanford	6,000	7,500	.....	[1]600 [2]2,000 [3]400	.....	.....	.....	.....	.....	[2]100	.....	.....	.....
Century Oil Co.:													
Long Beach	5,000	5,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Douglas Oil Co. of California:													
Bakersfield	7,000	7,500	.....	[1]4,600	.....	.....	[2]2,200	[1]1,300	.....	.....	.....	.....	.....
Paramount	7,000	7,000	5,200	.....	.....	.....	.....	.....	.....	.....	.....	.....	[1]3,500 [2]3,500
Santa Maria	3,500	3,500	2,800	.....	.....	.....	.....	.....	.....	.....	.....	.....	[2]2,800
Edgington Oil Refineries, Inc.:													
Long Beach	7,000	7,400	.....	.....	.....	.....	.....	.....	.....	.....	1,500	.....	[1]3,000 [2]500
Oxnard	2,500	2,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	[1]1,500
Envoy Petroleum Co.:													
Long Beach	3,500	3,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	[1]1,750 [2]270
Fletcher Oil Co.:**													
Wilmington	6,500	9,000	.....	[2]4,100	.....	.....	.....	.....	.....	[2]40	.....	.....	.....
General Petroleum Corp.:													
Torrance	125,000	128,000	38,000	[2]26,000 [5]26,000	[2]55,000	50.0	[7]14,300 [9]12,000	.....	[2]3,700	[2]700	.....	1,100	.....
Golden Bear Oil Co.:													
Oildale	4,000	4,100	.....	.....	.....	.....	.....	.....	.....	.....	2,000	.....	[1]1,500
Hancock Oil Co.:													
Signal Hill	18,900	21,000	16,000	[1]2,000 [2]10,000	[2]11,000	35.0	[3]3,000	[3]3,000	.....	[2]550	.....	.....	.....
Macmillan Petroleum Corp.:													
Long Beach	8,000	9,000	.....	.....	.....	.....	.....	.....	.....	.....	200	.....	[2]2,700
Mohawk Petroleum Corp.:													
Bakersfield	11,000	11,800	.....	[1]800 [3]3,500	.....	.....	[2]2,500	[1]925	.....	[1]65	.....	.....	.....
Newhall Refining Co.:													
Newhall	2,000	3,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	[1]1,200 [2]150

REFINERY SURVEY (CALIFORNIA Continued)

Company and location—	Crude capacity B.P.C.D.	Crude capacity B.P.S.D.	Charge, bbl. per stream day: Vacuum dist.	Thermal operations	Cat cracking: Total feed	Cat cracking: Per cent recycle	Catalytic reforming	Hydro. treating	Production, bbl. per stream day: Alkylation	Polymerization	Lubes	Coke (tons)	Asphalt
Oxnard Oil & Refining Co.:													
Oxnard	1,800	1,800	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	[1]1,000
Palomar Oil & Refining Corp.:													
Bakersfield	1,230	1,300	.....	.....	.....	.....	.....	.....	.....	.....	390	.....	[1]485 [3]100
Richfield Oil Corp.:													
Wilmington (Watson plant)	129,500	136,500	63,000	[1]23,000 [2]29,000	[1]63,000 [2]30,000	35.0 35.0	[6]17,000	[11]17,000 [14]8,000	[7]7,000	[2]1,900	.....	.....	[12,690 [2]765 [3]2,000
Rothschild Oil Co.:													
Santa Fe Springs	9,000	10,000	.....	[1]5,000	.....	.....	[1]1,200	.....	.....	[2]150	.....	.....	.....
Seaside Oil Co.:													
Ventura	5,500	5,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Shell Oil Co.:													
Martinez	55,000	57,800	11,600	[6]33,000	.....	.....	[1]5,800	.....	.....	.....	4,200	.....	[1]7,100
Wilmington-Dominguez	79,000	83,000	47,000	[6]36,000	[1]25,000	4.0	[1]4,000	[6]12,600	[1]5,800	.....	.....	.....	.....
Socal Oil & Refining Co.:													
Huntington Beach	2,500	2,500	.....	[2]1,800	.....	.....	.....	.....	.....	.....	.....	.....	[1]200
Standard Oil Co. of California:													
Bakersfield	19,000	20,000	.....	[9]10,500	.....	.....	.....	.....	.....	.....	.....	.....	[1]550 [3]550
El Segundo	150,000	163,000	84,500	[3]13,000 [9]69,500	[1]61,000	27.0	[1]33,500	[1]22,000	[1]5,800	.....	.....	.....	[1]5,550 [2]550 [3]2,200
Richmond	167,000	196,000	55,000	[2]8,800 [9]59,000	[2]46,500	24.0	[1]22,000 [3]14,000	[1]22,000	[2]4,300	.....	10,000	.....	[1]6,650 [2]2,750 [3]1,650
Sunland Refining Corp.:													
Bakersfield	5,000	5,300	.....	[2]1,200	.....	.....	[1]1,000	.....	.....	.....	.....	.....	.....
Sunset International Petroleum Corp.:													
Torrance	8,500	9,000	.....	[2]4,500	.....	.....	.....	.....	.....	[2]90	.....	.....	.....
Texas Co., The:													
Wilmington	60,000	(†)	*35,000	*[1]10,000	*[1]28,000	(‡)	*[1]10,000	*[4]9,000	*[1]4,400	.....	.....	.....	.....
Tidewater Oil Co.:													
Avon	107,700	114,000	74,500	[1]20,000 [4]42,000	[1]45,000	(‡)	[1]10,000	[1]34,500	[1]6,000	.....	1,670	1,200	.....
Union Oil Co. of California:													
Arroya Grande (Santa Maria plant)	21,500	24,500	.....	[5]15,000	.....	.....	.....	.....	.....	.....	.....	720	.....
Rodeo (Oleum plant)	45,800	48,200	34,100	[1]15,000 [5]13,000	.....	.....	[1]13,000	[1]18,500	.....	.....	3,100	500	[1]5,000
Santa Maria (Orcutt plant)	4,700	5,000	1,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	[1]1,400 [2]450
Wilmington (Los Angeles plant)	109,000	115,000	87,000	[1]16,000 [2]18,500	[1]34,000 [2]24,000	19.0 25.0	[1]12,900	[1]14,500	[1]5,000	.....	.....	.....	[1]5,750 [2]1,400
Wilshire Oil Co. of California:§													
Norwalk	34,000	35,000	10,000	[1]7,000 [3]10,000	[1]7,400	4.0	[1]10,000	[1]10,000	.....	[2]800	.....	.....	[1]2,000 [2]2,000 [3]1,000
Total †	1,244,030	1,338,400	567,000	548,900	433,000	.....	189,500	174,325	43,500	4,395	23,060	3,540	(¶)

¶Asphalt totals: (1) 56,325; (1) 12,335; (3) 7,500. §Bought by Pontiac Western Corp., a subsidiary of Pontiac Refining Corp., February 1958. **Temporarily closed.

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REFINERY SURVEY

Company and location	Crude capacity B.P.C.D.	Crude capacity B.P.S.D.	Charge, bbl. per stream day: Vacuum dist.	Thermal operations	Cat cracking: Total feed	Cat cracking: Per cent recycle	Catalytic reforming	Hydro. treating	Production, bbl. per stream day: Alkylation	Polymerization	Lubes	Coke (tons)	Asphalt
Colorado													
Bay Petroleum Corp.:													
Denver	10,000	10,500	3,000	[2]5,000 [3]3,500	[1]4,800	20.0	.....	.....	.....	[2]600	.....	.....	.....
Continental Oil Co.:													
Denver	12,300	13,700	.....	[1]3,500	[2]7,600	33.0	[1-3]3,500	.....	.....	[2]500	.....	.....	.....
Empire Petroleum Co.:													
Denver	5,000	5,500	2,200	.....	.....	.....	.....	.....	.....	.....	.....	.....	[1]1,200
Oriental Refining Co.:§													
Alamosa	1,000	1,000	.....	[1]600	.....	.....	.....	.....	.....	.....	.....	.....	.....
Denver	3,300	3,300	.....	[1]1,500	.....	.....	.....	.....	.....	.....	.....	.....	.....
Skelly Oil Co.:													
Denver	1,400	1,500	.....	[1]800	.....	.....	[1]650	.....	.....	.....	.....	.....	.....
Wesco Refining Co.:													
Rangely	2,000	2,000	.....	[3]200	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total	35,000	37,500	5,200	15,100	12,400	.....	4,150	.....	.....	1,100	.....	.....	[1]1,200

§Bought early 1958 by Flank Oil Co. of Billings, Mont.

Delaware													
Texas Co., The:													
Claymont	3,500	(†)	*1,750	.....	.....	.....	.....	.....	.....	.....	.....	.....	[1-2-3]1,500
Tidewater Oil Co.:													
Delaware City	120,000	130,000	83,700	[4]42,000	[1]102,000	43.1	[1-2]45,000	[1]88,000	[1]5,000	[2]5,100	.....	1,200	.....
Total†	123,500	133,700	85,500	42,000	102,000	.....	45,000	88,000	5,000	5,100	.....	1,200	[1-2-3]1,700

Florida													
Seminole Asphalt & Refining, Ltd.:													
St. Marks	2,000	2,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	[1]1,000 [2]500
Georgia													
American Oil Co.:													
Savannah	6,500	7,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	[1]3,800 [2]1,500
Illinois													
Advance Refining Co., Inc.:													
Centralia	3,000	3,000	.....	.....	[5]600	15.0	.....	.....	.....	.....	.....	.....	.....
Clark Oil & Refining Corp.:													
Blue Island	25,000	25,500	4,000	[1]1,800	[3]7,200	.....	[1]6,000	.....	.....	[2]600	.....	.....	.....
Cross, Henry H., Co.:													
Colmar	1,000	1,100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ohio Oil Co.:													
Robinson	42,400	43,500	15,700	[1]9,000 [5]6,500	[1]28,000	30.0	[4]8,000	.....	[1]1,500	[2]1,500	.....	250	.....
Pana Refining Co., Div. Illinois Farm Supply Co.:													
Pana	5,000	5,500	.....	[1]2,500	.....	.....	[1]700	.....	.....	[2]145	.....	.....	[1]1,050

REFINERY SURVEY (ILLINOIS Continued)

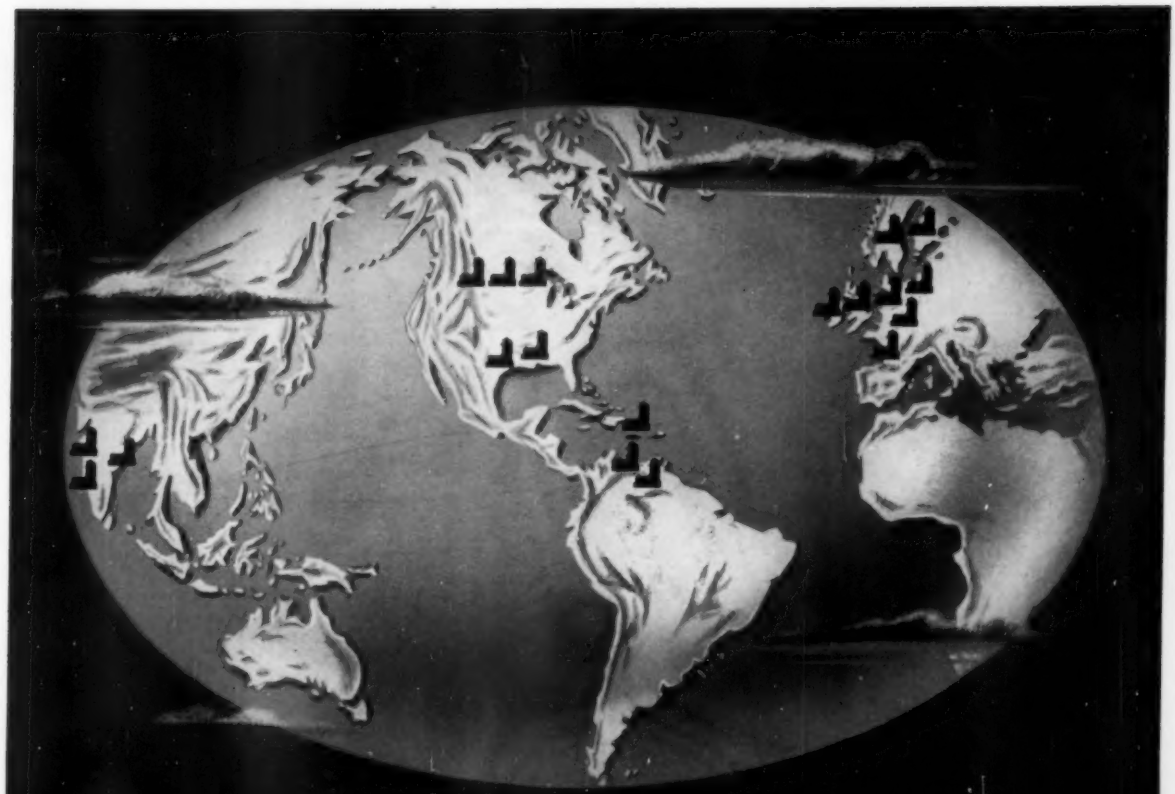
Company and location	Crude capacity B.P.C.D.	Crude capacity B.P.S.D.	Charge, bbl. per stream day: Vacuum dist.	Thermal operations	Cat cracking: Total feed	Cat cracking: Per cent recycle	Catalytic reforming	Hydro. treating	Production, bbl. per stream day: Alkylation	Polymerization	Lubes	Coke (tons)	Asphalt
Pure Oil Co.:													
Lemont	47,500	49,900	.....	[1]3,000	[1]25,000	12.0	.....	[12]17,000	[2]1,600	[2]1,800	.....	.....	[1]5,500
Shell Oil Co.:													
Wood River	175,000	184,000	71,500	[3]21,000 [6]14,800 [8]16,300	[1]72,000	24.0	[1]42,000	[8]32,600	[1]11,000	[2]1,250	3,250	850	[1]11,000
Sinclair Refining Co.:													
Hartford	29,000	30,500	12,000	[1]6,000	[1]11,550	5.0	[8]6,000	[11]6,000	.....	[2]800	.....	.....	[1]1,500 [2]500
Socony Mobil Oil Co., Inc.:													
East St. Louis	38,000	40,000	.....	[5]10,700	[2]28,100	30.0	[9]8,500	[6]16,000	[2]2,700	[2]700	.....	300	.....
Standard Oil Co. (Ind.):													
Wood River	51,300	53,500	6,000	[1]5,500 [3]6,000	[1]19,000	4.0	[5]9,000	[3]15,000	[1]3,400	[2]123	1,150	.....	[1]300 [2]1,200 [3]1,800
Texas Co., The:													
Lawrenceville	60,000	(†)	*20,000	*[1]12,000	*[1]30,000	(‡)	*[1]13,500	*[1]13,500	*[1]2,000	*[2]2,500	.....	.....	*[1-2-3]2,200
Lockport	65,000	(†)	*13,500	*[1]15,000 *[5]9,500	*[1]30,000	(‡)	*[1]19,000	*[1]19,000	*[1]4,400	*[2]600	.....	*250	*[1-2-3]3,000
Wireback Oil Co.:													
Plymouth	1,200	1,200	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total†	543,400	569,300	144,500	143,600	258,050	.....	116,300	122,700	27,300	10,418	4,400	1,700	(¶)

¶Asphalt totals: (1) 19,350; (2) 1,700; (3) 1,800; (1-2-3) 5,700.

Indiana

Company and location	Crude capacity B.P.C.D.	Crude capacity B.P.S.D.	Charge, bbl. per stream day: Vacuum dist.	Thermal operations	Cat cracking: Total feed	Cat cracking: Per cent recycle	Catalytic reforming	Hydro. treating	Production, bbl. per stream day: Alkylation	Polymerization	Lubes	Coke (tons)	Asphalt
Allby Asphalt & Refining Co.:													
Hammond	7,000	7,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	[1]3,000
Berry Refining Co.:													
Gary	12,700	14,000	3,000	.....	.....	.....	[1]2,000	[1]2,000	.....	.....	.....	.....	[1]1,200
Cities Service Oil Co. (Del.):													
East Chicago	53,000	53,000	.....	[5]15,000	[1]30,000	25.0	[2]13,000	.....	[1]2,560	.....	.....	440	.....
Indiana Farm Bureau Coop. Association, Inc.:													
Mount Vernon	12,000	12,500	3,800	[2]3,000	[1]4,700	20.0	[1]3,000	[1]2,100	.....	[2]300	.....	.....	.....
Jarvis Refining Co.:													
Troy	1,300	1,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
R. J. Oil & Refining Co., Inc.:													
Princeton	4,000	4,500	.....	[1]1,700	.....	.....	[1]750	.....	.....	.....	.....	.....	.....
Rock Island Refining Corp.:													
Indianapolis	14,000	15,550	4,500	[2]6,000	[1]8,000	15.0	[1]2,900	[1]5,500	.....	[2]500	.....	.....	.....
Sinclair Refining Co.:													
East Chicago	111,000	116,900	47,000	[1]12,000 [2]18,000	[1]45,000	20.0	[6]20,000	[1]13,500	.....	[2]2,450	2,750	.....	[1]4,000
Socony Mobil Oil Co., Inc.:													
East Chicago	35,000	36,800	.....	[1]7,500	[2]19,400	10.0	[2]10,000	[6]13,300	[1]2,700	.....	.....	.....	* .....
Standard Oil Co. (Ind.):													
Whiting	215,800	220,000	45,000	[1]42,000 [2]14,000 [3]15,300 [5]41,000	[1]70,000	.....	[3]14,000 [5]35,000	[3]56,000	[1]5,000	[2]1,000	8,000	930	[1]2,900 [3]4,500 [2]2,500
Total	465,800	481,750	103,300	175,500	177,100	.....	10,650	82,400	10,260	4,250	10,750	1,370	(¶)

¶Asphalt totals: (1) 11,100; (2) 4,500; (3) 2,500.



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3. Refinery for Venezuela Gulf Refining Company at Puerto La Cruz, Venezuela
4. Refinery for Societe Generale des Huiles de Petrole at Dunkirk, France
5. "Portable" refinery for U. S. Navy Department
6. Lube oil refinery for Cit-Con Oil Corporation at Lake Charles, Louisiana
7. Refinery for International Refineries Inc. at Wrenshall, Minnesota
8. Refinery for Vacuum Oil Company Ltd. at Coryton, England
9. Refinery for Burmah-Shell Oil Company at Bombay, India
10. Refinery for Standard-Vacuum Oil Company at Bombay, India
11. Refinery for Standard Oil Company (Indiana) at Mandan, North Dakota
12. Refinery for Suntide Refining Company at Corpus Christi, Texas
13. Refinery for Commonwealth Refining Company at Ponce, Puerto Rico
14. Refinery for Esso Standard Oil Company at Antwerp, Belgium
15. Refinery for Caltex at Visakhapatnam, India
16. Refinery for Neste Oy at Turku, Finland
17. Refinery for Irish Refining Co., Ltd., Cork, Ireland
18. Refinery for Esso Standard Française, Bordeaux, France
19. Refinery for Purfina Mineraloelraffineria A.G., Duisburg, Germany

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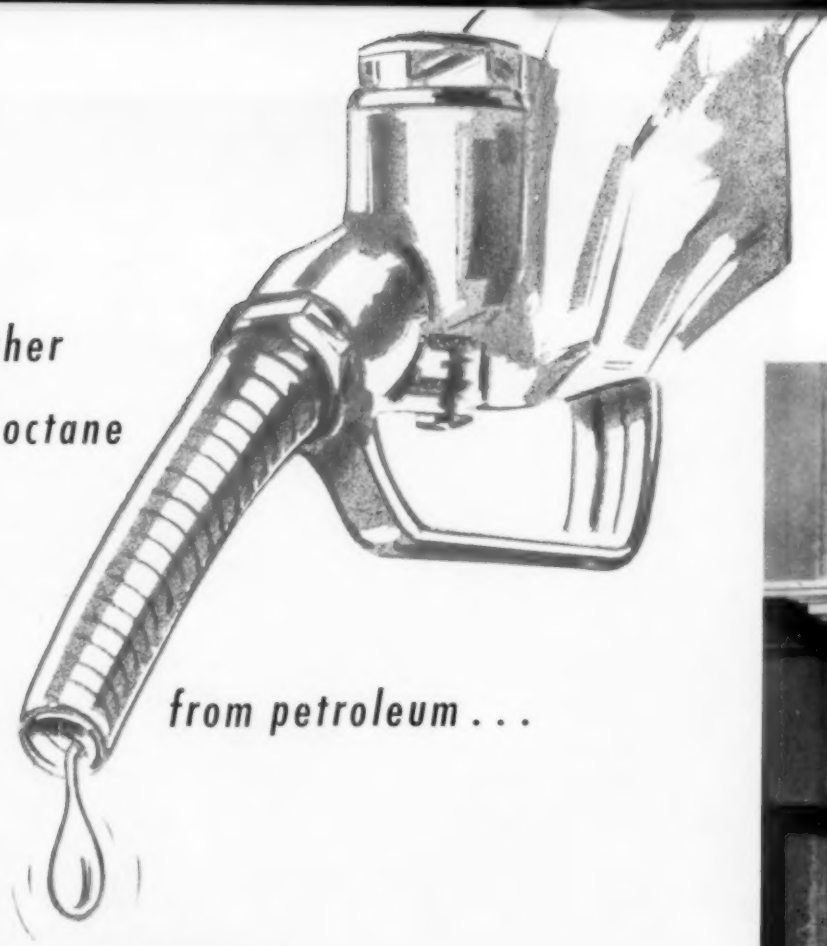

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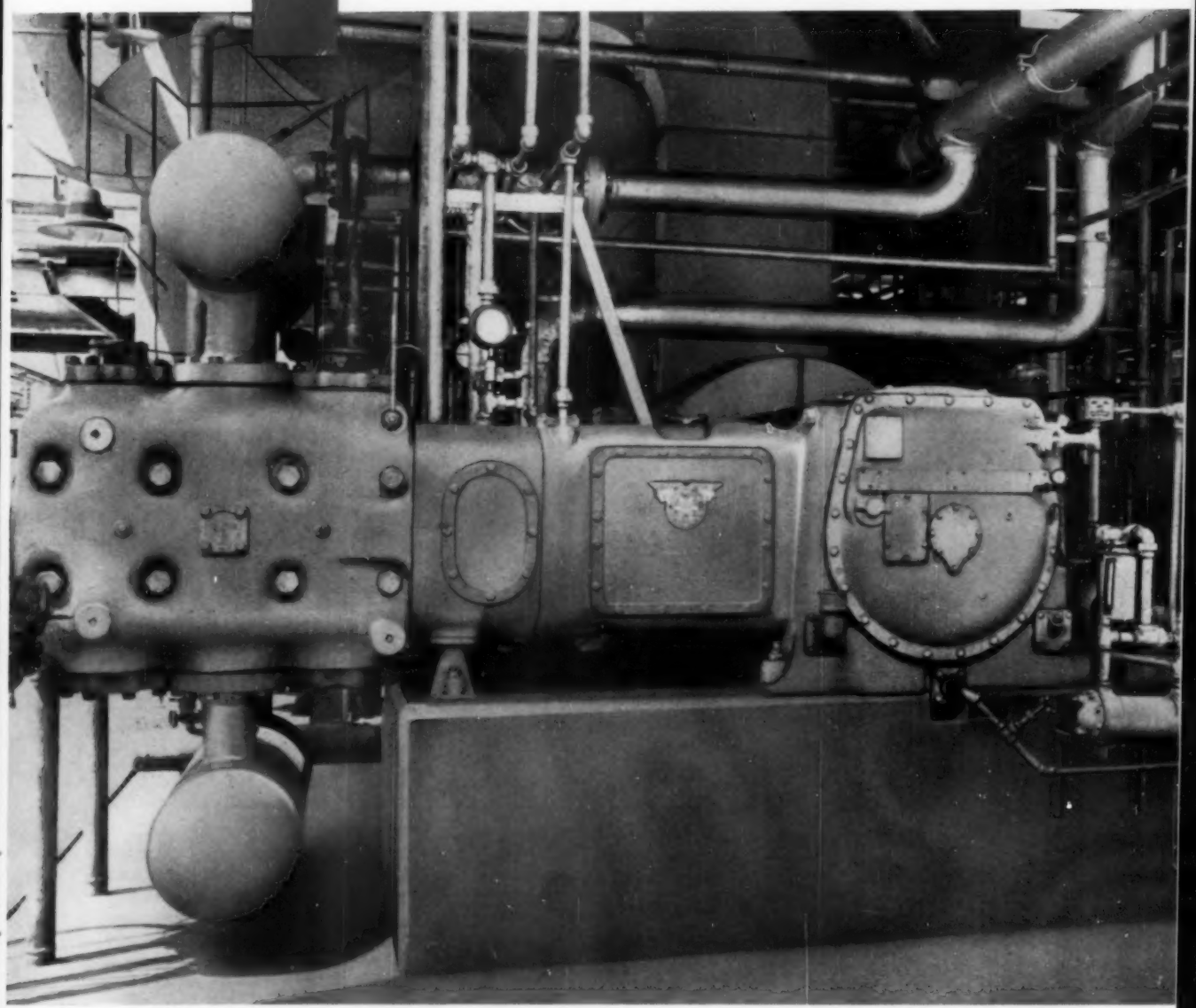

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Company and location	Crude capacity B.P.C.D.	Crude capacity B.P.S.D.	Charge, bbl. per stream day: Vacuum dist.	Thermal operations	Cat cracking: Total feed	Cat cracking: Per cent recycle	Catalytic reforming	Hydro. treating	Production, bbl. per stream day: Alkylation	Polymerization	Lubes	Coke (tons)	Asphalt
Kansas													
Anderson-Prichard Oil Corp.:													
Arkansas City	25,000	26,000	5,000	[1]3,500	[1]11,000	45.0	[1]5,000	.....	.....	[2]600	.....	.....	[1]1,200
Century Refining Co., Inc.:													
Shallow Water	4,000	4,000	.....	[1]1,500	.....	.....	.....	.....	.....	.....	.....	.....	.....
Chanute Refining Co.:													
Chanute	1,000	1,000	1,000	[2]1,000	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cooperative Refinery Association:													
Coffeyville	23,500	24,000	6,000	[5]6,000	[1]19,500	45.0	[1]4,200	[1]2,200	.....	[2]1,200	1,200	150	[1]1,200
Phillipsburg	9,500	10,000	3,500	.....	[1]9,500	55.0	.....	.....	.....	[2]750	.....	.....	[1]1,250
Derby Refining Co.:													
Wichita	20,000	22,000	10,000	[1]3,000	[2]9,000	22.0	[5]2,500	[3]4,000	.....	[2]500	.....	.....	[1]1,800 [2]220
El Dorado Refining Co.:**													
El Dorado	19,000	20,000	5,000	.....	[1]10,000	33.3	[1]2,500	.....	.....	[2]1,200	.....	.....	[1]1,900 [2]300
Mid-America Refining Co., Inc.:													
Chanute	2,400	2,500	.....	[1]1,300	.....	.....	.....	.....	.....	.....	.....	.....	.....
National Coop. Refinery Association:													
McPherson	26,500	29,000	.....	[1]2,000 [5]11,000	[1]18,000	32.0	[1]5,500	.....	[2]1,900	§[2]1,000	.....	250	.....
Phillips Petroleum Co.:													
Kansas City	58,000	(†)	15,000	.....	[1]40,000	40.0	[1]16,000	.....	.....	[2]2,000	2,400	.....	[1]2,300
Skelly Oil Co.:													
El Dorado	42,000	45,000	12,000	[1]12,000	[1]22,500	12.0	[1]7,500	.....	.....	[2]1,400	.....	.....	[1]3,000
Socony Mobil Oil Co., Inc.:													
Augusta	37,000	38,700	13,200	[1]4,000	[2]22,000	35.0	[2]9,500	.....	[2]1,700	.....	.....	.....	[1]5,250 [2]1,000 [3]890
Standard Oil Co. (Ind.):													
Neodesha	23,100	24,000	.....	[5]5,200	[1]11,000	7.0	.....	.....	[1]1,000	.....	.....	85	.....
Vickers Petroleum Co., Inc.:													
Potwin	16,000	17,000	8,000	[3]1,000 [5]3,000	[2]6,500	30.0	[5]2,500	.....	.....	[2]500	.....	.....	.....
Total	307,000	327,600	78,700	54,500	179,000	.....	55,200	6,200	4,600	9,150	3,600	485	(¶)

¶Asphalt totals: (1) 17,900; (2) 1,520; (3) 890. §Only 350 bbl. of production capacity is utilized when alky unit is operating. **Bought by American Petrofina, Inc., early in 1958.

Kentucky

Ashland Oil & Refining Co.:													
Catlettsburg	75,000	80,000	18,000	[1]6,000 [3]2,000	[1]38,000	26.0	[4]6,000	[1]9,000	.....	[2]4,000	.....	.....	[1]6,000 [2]6,000 [3]2,000
Louisville Refining Co., Inc.:													
Louisville	7,540	8,000	4,800	[1]1,120 [2]1,120	[1]4,550	21.0	[1]2,000	[1]2,000	.....	[2]325	.....	.....	.....
Sohio Petroleum Co.:													
Latonia	16,000	17,000	10,000	(§)	.....	.....	.....	.....	.....	(§)	.....	.....	[2]3,500

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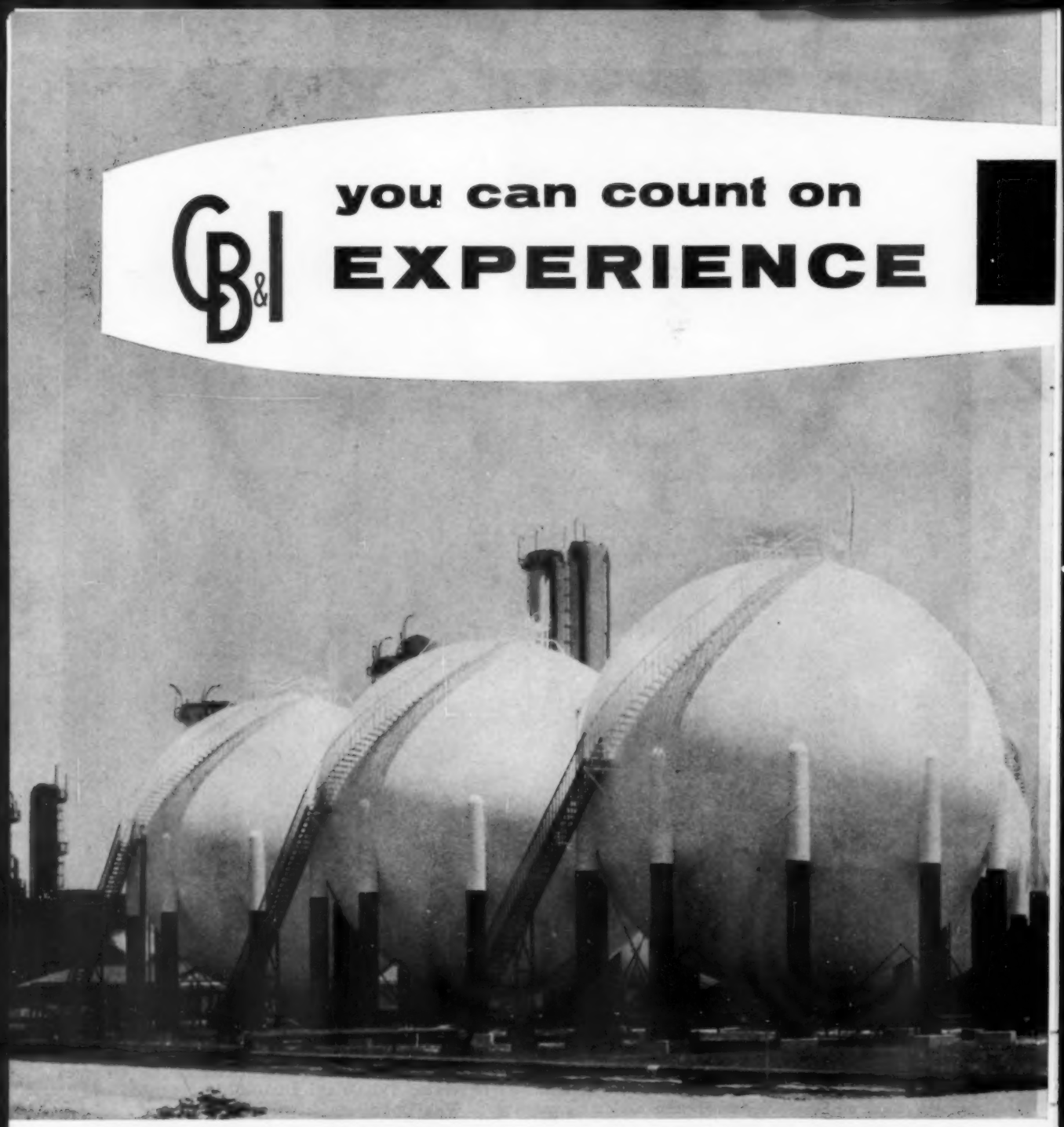

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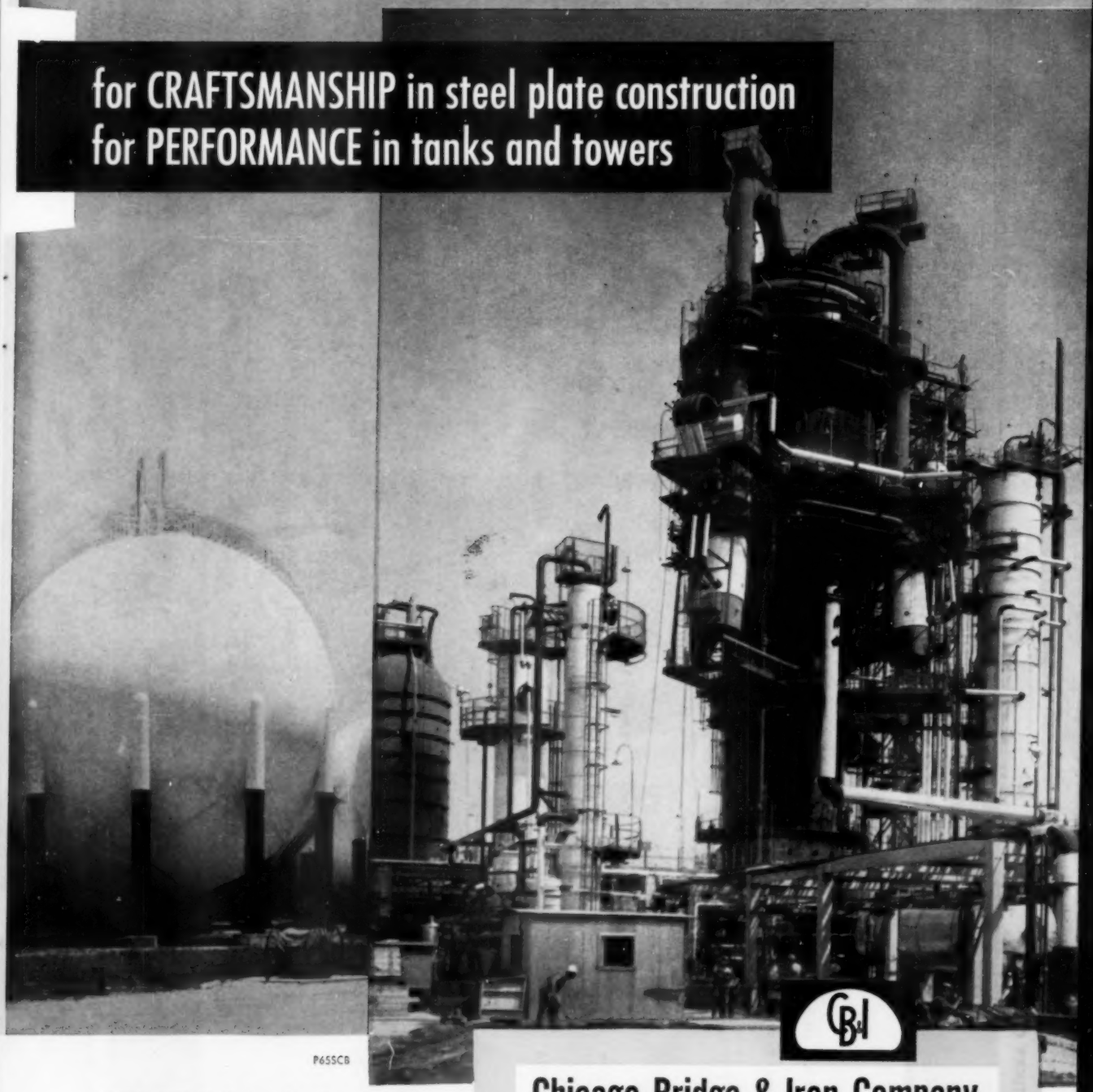

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ABOVE, LEFT: 19 Hortonspheres® are included in the extensive storage facilities furnished by CB&I through The Fluor Corp., Ltd., for the multi-million dollar plant of *Texas Butadiene and Chemical Corporation*, near Houston, Texas.

ABOVE, RIGHT: Components for this Orthoflow Converter, for the new *American Oil Company* refinery at Yorktown, Virginia were fabricated by CB&I and furnished through the M. W. Kellogg Company. CB&I-built components included a reactor, regenerator, vacuum tower, crude tower, absorber tower and catalyst hoppers.

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REFINERY SURVEY (KENTUCKY Continued)

Company and location—	Crude capacity— B.P.C.D.	Crude capacity— B.P.S.D.	Charge, bbl. per stream day: Vacuum dist.	Thermal operations	Cat cracking: Total feed	Cat cracking: Per cent recycle	Catalytic reforming	Hydro. treating	Production, bbl. per stream day: Alkylation	Polymerization	Lubes	Coke (tons)	Asphalt
Somerset Refinery, The:													
Somerset	1,500	1,500	.....	.....	.....	.....	[1]400	.....	.....	.....	.....	.....	.....
Total	100,040	106,500	32,800	10,240	42,550	.....	8,400	11,000	.....	4,325	.....	.....	(¶)

¶Asphalt totals: (1) 6,000; (2) 9,500; (3) 2,000. §7,000-bbl. gas-oil cracking, 3,500-bbl. naphtha reforming, and 500-bbl. cat polymerization capacities not currently operating—in standby.

Louisiana

American Oil Co.:													
Destreham	35,500	37,500	7,000	[5]10,500	[1]19,200	6.0	[2]3,200	.....	[1]2,000	.....	.....	400	[1]5,500 [2]500
Atlas Processing Co.:§													
Shreveport	**17,500	**19,000	.....	(††)	.....	.....	[1]7,400	.....	.....	[2]500	.....	.....	.....
Bayou State Oil Corp.:													
Hosston	800	1,000	565	.....	.....	.....	.....	.....	.....	.....	483	.....	[1]183
Bay Petroleum Corp.:													
Chalmette	25,000	26,000	5,000	[2]9,000	[1]12,000	20.0	[1]6,000	.....	.....	[2]900	.....	.....	.....
Calumet Refining Co.:													
Princeton	1,800	2,000	.....	.....	.....	.....	.....	.....	.....	.....	800	.....	[1]370
Canal Refining Co.:													
Church Point	1,700	1,800	.....	.....	.....	.....	[6]750	.....	.....	.....	.....	.....	.....
Cities Service Refining Corp.:													
Lake Charles	185,000	190,700	26,750	‡‡[2]12,000	[1]135,000	36.5	[2]18,000	.....	[1]16,000	.....	.....	.....	.....
Continental Oil Co.:													
Westlake	53,000	56,000	.....	[1]6,100 [3]4,000 [5]10,000	[2]25,000	16.0	[1]6,200	.....	[1]2,800	[1]670 [2]660	.....	325	.....
Cotton Valley Solvents, Inc.:													
Cotton Valley	4,200	5,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Esso Standard Oil Co.:													
Baton Rouge	355,000	367,700	130,000	[1]30,000 [2]14,000	[1]189,000	28.5	[2]27,800	.....	[1]15,000	[2]7,000	10,900	.....	[1]8,300 [2]200 [3]1,500
Evangeline Refining Co., Inc.:													
Jennings	2,000	2,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ingram Oil & Refining Co.:													
Meraux	14,400	16,000	5,000	.....	[1]6,000	20.0	[1]3,000	.....	.....	[2]450	.....	.....	.....
Shell Oil Co.:													
Norco	95,000	100,000	45,000	[3]4,800 [5]14,200	[1]78,000	25.0	.....	.....	[1]7,400	[2]1,400	.....	.....	[1]1,750 [2]200 [3]300
Total	790,900	825,200	219,315	114,600	464,200	.....	72,350	.....	43,200	11,580	12,183	725	(¶)

¶Asphalt totals: (1) 16,103; (2) 900; (3) 1,800. §Bought by American Petrofina, Inc., early 1958. **Natural gasoline and cycle product charged to stills. ††2,000-bbl. capacity naphtha reforming not operating. ‡‡Combination thermal reforming-cracking unit being primarily for visbreaking operations.

Maryland

American Bitumuls & Asphalt Co.:													
Baltimore	4,500	7,500	7,500	§[2]6,000	.....	.....	.....	.....	.....	.....	.....	.....	[1]6,000 [2]400 [3]4,300

REFINERY SURVEY (MARYLAND Continued)

Company and location	Crude capacity B.P.C.D.	Crude capacity B.P.S.D.	Charge, bbl. per stream day: Vacuum dist.	Thermal operations	Cat cracking: Total feed	Cat cracking: Per cent recycle	Catalytic reforming	Hydro. treating	Production, bbl. per stream day: Alkylation	Polymerization	Lubes	Coke (tons)	Asphalt
American Oil Co.:													
Baltimore	9,000	10,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	[1]5,500 [2]1,500
Esso Standard Oil Co.:													
Baltimore	20,000	22,000	12,000	(**)	(**)	.....	(**)	(**)	(**)	.....	.....	.....	[1]5,000 [2]2,000
Total	33,500	39,500	19,500	6,000	.....	.....	.....	.....	.....	.....	.....	.....	(¶)

¶Asphalt totals: (1) 16,500; (2) 3,900; (3) 4,300. §Atmospheric unit can be operated as visbreaker during winter months only for production of Bunker C fuel oil. **Fluid coking, cat cracking, cat reforming, hydrofining, and alkylation units are shut down permanently.

Massachusetts

Company and location	Crude capacity B.P.C.D.	Crude capacity B.P.S.D.	Charge, bbl. per stream day: Vacuum dist.	Thermal operations	Cat cracking: Total feed	Cat cracking: Per cent recycle	Catalytic reforming	Hydro. treating	Production, bbl. per stream day: Alkylation	Polymerization	Lubes	Coke (tons)	Asphalt
Esso Standard Oil Co.:													
Everett	50,000	55,000	13,100	.....	[1]30,000	39.0	[10]7,200	[2]7,200	.....	[2]1,800	.....	.....	§[1]4,900 §[2]5,100

§Capacity when running for maximum production of oxidized asphalt.

Michigan

Company and location	Crude capacity B.P.C.D.	Crude capacity B.P.S.D.	Charge, bbl. per stream day: Vacuum dist.	Thermal operations	Cat cracking: Total feed	Cat cracking: Per cent recycle	Catalytic reforming	Hydro. treating	Production, bbl. per stream day: Alkylation	Polymerization	Lubes	Coke (tons)	Asphalt
Aurora Gasoline Co.:													
Detroit	44,000	47,000	24,000	[2]7,000 [4]4,000	[1]20,000	15.0	[11]5,500	[1]10,000	.....	[2]1,400	.....	100	[1]6,500
Elsie	6,000	6,700	.....	.....	.....	.....	[1]1,500	.....	.....	.....	.....	.....	.....
Muskegon	14,500	16,000	8,000	[2]2,500	[1]7,000	20.0	[1]2,400	[1]700	.....	[2]350	.....	.....	[1]3,000
Bay Refining Corp., Div. Dow Chemical Co.:													
Bay City	9,950	10,500	5,000	.....	[2]6,000	30.0	.....	.....	.....	[2]750	.....	.....	.....
Crystal Refining Co.:													
Carson City	6,000	6,700	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lakeside Refining Co.:													
Kalamazoo	3,500	3,900	.....	[1]1,500	.....	.....	[8]1,200	.....	.....	.....	.....	.....	.....
Leonard Refineries, Inc.:													
Alma (Leonard Division)	9,500	10,500	5,000	.....	[2]7,000	20.0	[5]2,500	[2]5,200 [3]2,500	.....	[1]60	.....	.....	[1]2,250 [2]600
Alma (Mid-West Division)	10,000	11,000	.....	[2]3,500	.....	.....	[1]2,250	.....	.....	[1]100	.....	.....	.....
Mount Pleasant (Roosevelt Div.)	7,500	7,700	.....	.....	.....	.....	[1]2,000	[13]500	.....	.....	.....	.....	.....
Marvel Refining Co.:													
Grand Rapids	1,100	2,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Naph-Sol Refining Co.:													
Muskegon	5,250	5,500	.....	[1]2,500	.....	.....	[1]1,050	.....	.....	[2]70	.....	.....	.....
Osceola Refining Co.:													
Reed City	1,500	2,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Petroleum Specialties, Inc.:													
Flat Rock	6,000	6,000	.....	[1]800 [3]2,500	.....	.....	[1]1,500	.....	.....	.....	.....	.....	.....
Socony Mobil Oil Co., Inc.:													
Trenton	29,500	31,000	.....	[5]6,600	[2]19,800	35.0	[9]9,300	[6]9,000	.....	[2]900	.....	200	.....
West Branch Refineries, Inc.:													
West Branch	5,000	5,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	[1]750
Total	159,300	171,500	42,000	30,900	59,800	.....	29,200	27,900	.....	3,630	.....	300	(¶)

¶Asphalt totals: (1) 12,500; (2) 600.

DESIGNING

Photograph above shows status of 3,800 BPD cat reformer at the Denver refinery of Bay Petroleum Company (subsidiary of Tennessee Gas Transmission Company) just prior to completion. Designed to use Sinclair-Baker regenerative catalyst RD-150, this unit promises optimum yields of high octane reformate, low catalyst cost per barrel, and minimum equipment corrosion and contamination.

Kellogg has engineered and built cat reformers designed for catalyst RD-150 in capacities from 875 BPD to 24,000 BPD. Just before completion of the Bay unit, a 2,500 BPD reformer was placed on stream in Europe. A representative would be glad to discuss investment and operating costs, yields, catalyst life, and other pertinent details of Kellogg-designed cat reformers with interested oil refiners.

IN 3-D

REDUCES INVESTMENT
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Cuts Engineering Time

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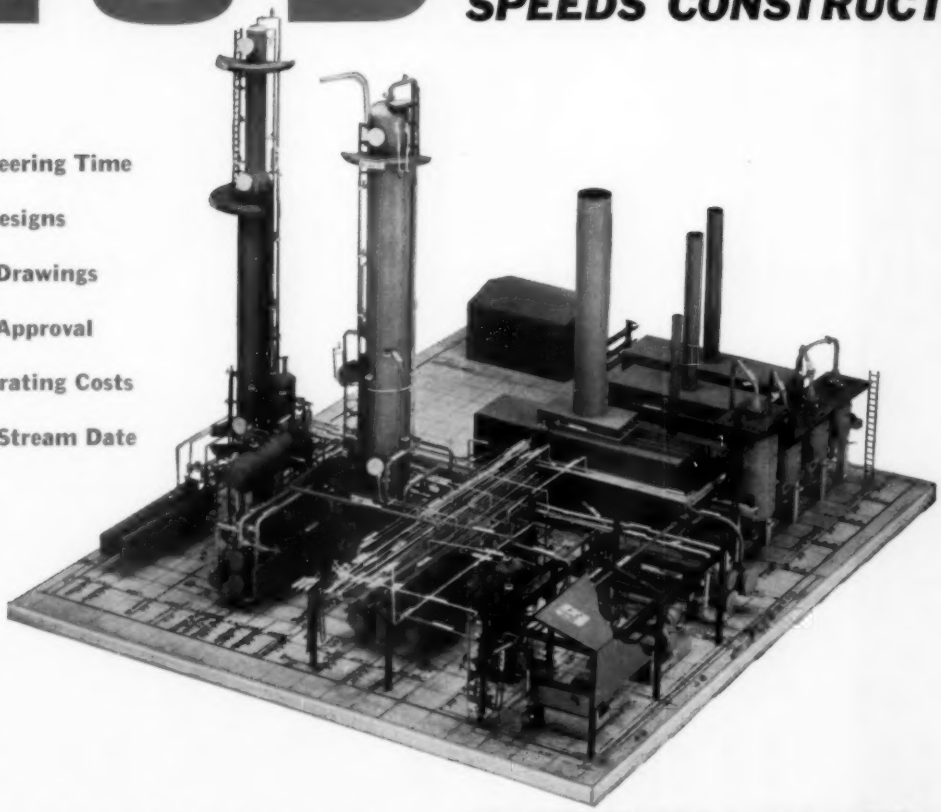
Minimizes Drawings

Facilitates Approval

Lowers Operating Costs

Speeds On-Stream Date



A recent example of a Kellogg technique that is sweeping the industry, this cat reformer typifies the time-and-money-saving aspects of designing with scale models. These include: conventional drawings of over-all layout and piping eliminated; man-hours spent on piping design cut in half; engineering and construction completed in a fraction of the normal time. Kelloggram No. 5, sent on request, describes techniques and economics.

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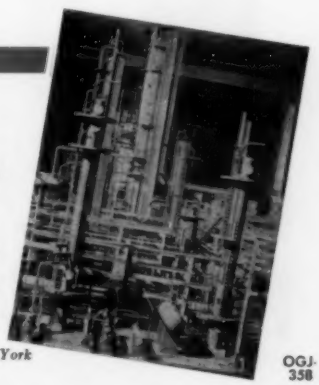

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☐ Send information on model components and how they may be obtained.

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OGJ-358

Company and location	Crude capacity B.P.C.D.	Crude capacity B.P.S.D.	Charge, bbl. per stream day: Vacuum dist.	Thermal operations	Cat cracking: Total feed	Cat cracking: Per cent recycle	Catalytic reforming	Hydro. treating	Production, bbl. per stream day: Alkylation	Polymerization	Lubes	Coke (tons)	Asphalt
Minnesota													
Great Northern Oil Co.:													
Pine Bend	(†)	33,000	.....	[5]10,000	[2]25,000	40.0	[5]5,000	[3]16,000	.....	[2]1,000	.....	550	.....
International Refineries, Inc.:													
Wrenshall	11,000	12,000	.....	.....	[1]5,000	35.0	[10]2,800	[2]2,800	.....	[2]270	.....	.....	.....
Northwestern Refining Co.:													
New Brighton	2,500	3,300	1,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
St. Paul Park	16,000	17,000	10,000	.....	[1]12,000	40.0	.....	.....	.....	[2]500	.....	.....	.....
Total†	60,900	65,300	11,500	10,000	42,000	.....	7,800	18,800	.....	1,770	.....	550	.....
Mississippi													
Paluxy Asphalt Co.:													
Yazoo City	5,350	5,600	2,000	[1]2,000	.....	.....	.....	.....	.....	[2]120	.....	.....	[2]1,800 [3]1,800
Pontiac Eastern Corp.:													
Hattiesburg	10,450	11,000	.....	[4]4,800	[2]25,700	63.0	[1]2,500	[1]1,200	[1]2,500	.....	.....	225	.....
Southland Co.:													
Sandersville	5,350	5,600	3,100	.....	.....	.....	.....	.....	.....	.....	.....	.....	[1]2,250
Total	21,150	22,200	5,100	6,800	25,700	.....	2,500	1,200	2,500	.....	.....	225	(¶)

¶Asphalt totals: (1) 2,250; (2) 1,800; (3) 1,800.

Missouri													
Standard Oil Co. (Ind.):													
Sugar Creek	76,100	80,000	7,200	[1]19,600 [3]6,000 [5]24,900 [6]5,500	[1]40,000	5.0	[5]14,000	[3]20,000	[1]3,800	[2]1,800	.....	505	[2]1,100 [3]2,700
Montana													
Big West Oil Co. of Montana:													
Kevin	2,250	2,500	.....	[6]1,250	.....	.....	[1]1,000	.....	.....	[1]20	.....	.....	[3]225
Carter Oil Co.:													
Billings	24,000	27,000	10,000	[4]3,800	[1]25,000	50.0	[10]2,500	[2]6,900	.....	[2]975	.....	210	[1]5,000
Continental Oil Co.:													
Billings	9,800	10,700	.....	.....	[1]10,500	54.0	[15]2,500	[7]7,500	.....	[2]450	.....	.....	.....
Diamond Asphalt Co.:													
Chinook	1,415	1,500	700	.....	.....	.....	.....	.....	.....	.....	.....	.....	[1]700
Farmers Union Central Exchange:													
Laurel	19,000	20,000	8,000	[2]5,500	[1]11,000	1.1	.....	.....	.....	[1-2]700	.....	.....	[1]3,900
Jet Fuel Refinery:													
Mosby	600	600	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Phillips Petroleum Co.:													
Great Falls	3,000	(†)	1,600	.....	[1]3,000	63.0	.....	.....	.....	[2]50	.....	.....	[1]425
Texas Calgary Co.:													
Lodge Grass	1,125	1,425	475	.....	.....	.....	.....	.....	.....	.....	.....	.....	[1]380
Texas Co., The:													
Sunburst§	8,000	(†)	.....	*[1]5,000	.....	.....	.....	.....	.....	*[2]100	.....	.....	.....

REFINERY SURVEY (MONTANA Continued)

Company and location	Crude capacity B.P.C.D.	Crude capacity B.P.S.D.	Charge, bbl. per stream day: Vacuum dist.	Thermal operations	Cat cracking: Total feed	Cat cracking: Per cent recycle	Catalytic reforming	Hydro. treating	Production, bbl. per stream day: Alkylation	Polymerization	Lubes	Coke (tons)	Asphalt
Union Oil Co. of California:													
Cut Bank	3,800	4,200	.....	[1]400 [2]2,300	.....	.....	[6]600	[1]900	.....	[2]75	.....	.....	.....
Unity Petroleum Corp.:													
Kalispell	1,000	1,200	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	[1]400
Total†	73,990	80,825	20,775	18,850	49,500	.....	6,600	15,300	.....	2,370	.....	210	(¶)

¶Asphalt totals: (1) 10,805; (3) 225. §To be shut down and dismantled in early 1959 when Washington plant is complete.

Nebraska

Cooperative Refinery Association:													
Scottsbluff	2,235	2,400	.....	[1]1,100	.....	.....	[1]650	.....	.....	.....	.....	.....	.....
Searle Petroleum Co.:													
Salem	1,100	1,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total	3,325	3,400	.....	1,100	.....	.....	650	.....	.....	.....	.....	.....	.....

New Jersey

California Oil Co.:													
Perth Amboy	89,000	96,000	50,500	[2]5,000	[2]29,000	.....	[1]14,000	.....	[1]2,100	[2]300	.....	.....	[1]5,500
Cities Service Oil Co. (Pa.):													
Linden	14,300	15,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	[1]3,300 [2]2,900 [3]1,300
Esso Standard Oil Co.:													
Bayonne	25,000	27,500	15,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	[1]8,200 [2]2,000
Linden	168,000	175,000	73,800	[2]12,000 [3]15,000 §[6]8,500	[1]117,000	29.0	[10]20,000	[2]50,000	[1]10,230	[2]6,700	.....	.....	.....
Socony Mobil Oil Co., Inc.:													
Paulsboro	80,000	84,200	41,000	.....	[2]37,500	25.0	[2]22,000	[4]44,400	[2]2,400	.....	8,200	.....	.....
Texas Co., The:													
Westville	66,000	(†)	[6]25,000	[6][2]12,000 [6]9,000	[6][1]35,000	(‡)	[6][1]12,000	[6][1]12,000 [6][4]6,000	[6][1]2,000	[6][2]2,500	.....	.....	.....
Total†	442,300	467,200	206,600	63,800	222,400	.....	69,300	114,400	16,930	9,300	8,700	.....	(¶)

¶Asphalt totals: (1) 17,000; (2) 4,900; (3) 1,300. §Available only at expense of 6,500 bbl. of reforming capacity included above.

New Mexico

Continental Oil Co.:													
Artesia	3,900	4,300	.....	[1]1,875	.....	.....	[4]1,500	.....	.....	.....	.....	.....	[1]700
El Paso Natural Gas Products Co.:													
Brickland	4,000	4,200	.....	[9]1,600	.....	.....	[1]480	.....	.....	[1]65	.....	.....	.....
Gallup	7,200	8,000	2,480	.....	[1]2,080	25.0	[1]2,780	.....	[2]750	.....	.....	.....	.....
Famariss Oil & Refining Co.:													
Monument	1,380	1,400	.....	.....	.....	.....	[1]650	[1]680	.....	.....	.....	.....	.....
Four States-Western Oil Refining Co.:													
Flora Vista	500	1,200	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

REFINERY SURVEY (NEW MEXICO Continued)

Company and location	Crude capacity B.P.C.D.	Crude capacity B.P.S.D.	Charge, bbl. per stream day: Vacuum dist.	Thermal operations	Cat cracking: Total feed	Cat cracking: Per cent recycle	Catalytic reforming	Hydro. treating	Production, bbl. per stream day: Alkylation	Polymerization	Lubes	Coke (tons)	Asphalt
Malco Refineries, Inc.:													
Artesia	11,500	12,000	2,500	.....	[2]6,000	23.0	.....	.....	[2]900	[2]400	.....	.....	[1]1,400
Total	28,480	31,100	4,980	3,475	8,080	.....	5,410	680	1,650	465	.....	.....	[1]2,100
New York													
Frontier Oil Refining Co., Div. Ashland Oil & Refining Co.:													
North Tonawanda	27,000	29,000	10,000	.....	[1]15,000	27.0	[15]7,500	[14]10,000	.....	[2]550	.....	.....	[1]3,000 [2]3,000
Gulf Oil Corp.:**													
Staten Island	17,000	18,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sinclair Refining Co.:													
Wellsville	8,000	8,400	3,000	[1]3,000 [25]5,000	.....	.....	.....	.....	.....	[2]100	2,500	.....	[1]300
Brooklyn	28,000	29,500	.....	.....	[2]23,000	55.0	.....	.....	.....	1,200	.....	.....	.....
Buffalo	26,000	27,400	6,300	.....	[2]18,000	35.0	[9]9,000	[6]9,000	[1]3,000	(§)	.....	.....	[1]330 [2]1,950
Total	106,000	112,800	19,300	8,000	56,000	.....	16,500	19,000	3,000	1,850	2,500	.....	(¶)
North Dakota													
Standard Oil Co. (Ind.):													
Mandan	34,700	37,500	.....	.....	[1]23,000	45.0	[5]6,000	.....	.....	[2]4,365	.....	.....	.....
Westland Oil Co.:													
Williston	1,950	2,000	.....	[1]1,000	.....	.....	[1]200	.....	.....	.....	.....	.....	.....
Total	36,650	39,500	.....	1,000	23,000	.....	6,200	.....	.....	4,365	.....	.....	.....
Ohio													
American Bitumuls & Asphalt Co.:													
Cincinnati	5,500	10,000	10,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	[1]7,500 [3]4,000
Ashland Oil & Refining Co.:													
Canton	28,000	30,000	15,000	[2]5,000	[1]15,000	20.0	[15]7,500	[14]10,000	.....	[2]650	.....	.....	[1]3,600 [2]3,600
Dewese Oil Refinery:													
Weston	1,000	1,000	.....	[2]800	.....	.....	.....	.....	.....	.....	400	.....	.....
Gulf Oil Corp.:													
Cincinnati	32,000	35,000	11,400	[1]6,000	[1]19,000	30.0	[1]10,000	.....	.....	[2]1,500	.....	.....	[1]2,600
Toledo	42,000	44,000	8,000	[1]5,000	[1]19,000	21.0	[1]10,000	.....	.....	[2]1,500	.....	.....	.....
National Refining Co., Div. of Ashland Oil & Refining Co.:													
Findlay	15,000	16,000	8,000	[1]2,500 [2]3,000 [3]1,500	.....	.....	.....	.....	.....	[2]200	900	.....	[1]2,500 [2]2,500

¶Asphalt totals: (1) 3,630; (2) 4,950. §1,000-bbl. catalytic polymerization unit is idle. **Temporarily shut down.

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REFINERY SURVEY (OHIO Continued)

Company and location	Crude capacity B.P.C.D.	Crude capacity B.P.S.D.	Charge, bbl. per stream day: Vacuum dist.	Thermal operations	Cat cracking: Total feed	Cat cracking: Per cent recycle	Catalytic reforming	Hydro. treating	Production, bbl. per stream day: Alkylation	Polymerization	Lubes	Coke (tons)	Asphalt
Pure Oil Co.:													
Newark	17,500	(†)	6,100	[1]6,400	[1]6,500	.....	[5]3,000	[12]3,000	.....	[2]450	.....	.....	.....
Toledo	38,400	(†)	4,400	[1-2-3]5,100 [5]7,000	[1]17,500	34.0	[3]5,000	.....	.....	[2]1,270	.....	150	.....
Standard Oil Co. (Ohio):													
Cleveland	52,000	55,000	18,000	[1]12,000	[2]28,000	25.0	[5]11,000	[3]11,000	.....	[2]1,000	1,600	.....	[2]7,000
Lima	48,000	50,000	11,000	[5]11,000	[1]37,000	20.0	[1]12,000	[1]13,000	.....	[2]800	1,700	320	.....
Toledo	23,000	28,000	.....	[1]8,000 [2]7,000 [5]7,000	.....	.....	.....	.....	[15]900	[2]700	.....	180	.....
Sun Oil Co.:													
Toledo	95,000	(†)	.....	[*3]17,000	[*3]62,000	(‡)	[*1]14,700	.....	[*1]1,400	.....	.....	.....	.....
Total	397,400	427,700	91,900	106,200	210,800	.....	74,800	37,000	7,500	8,070	4,600	650	(¶)

¶Asphalt totals: (1) 16,200; (2) 13,100; (3) 4,000.

Oklahoma

Company and location	Crude capacity B.P.C.D.	Crude capacity B.P.S.D.	Charge, bbl. per stream day: Vacuum dist.	Thermal operations	Cat cracking: Total feed	Cat cracking: Per cent recycle	Catalytic reforming	Hydro. treating	Production, bbl. per stream day: Alkylation	Polymerization	Lubes	Coke (tons)	Asphalt
Allied Materials Corp.:													
Stroud	3,000	3,000	2,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	[1]1,500 [2]1,000
Anderson-Prichard Oil Corp.:													
Cyril	12,000	12,500	5,000	[1]1,900	[1]11,000	45.0	[6]1,000	[1]1,000	.....	[2]600	.....	.....	[1]1,200 [2]500
Bell Oil & Gas Co.:													
Grandfield	7,250	7,500	.....	[9]3,500	.....	.....	[1]1,900	.....	.....	[2]150	.....	.....	.....
Champlin Oil & Refining Co.:													
Enid	33,000	34,700	15,000	.....	[1]15,000	33.3	[5]5,000	.....	[2]1,500	[2]1,000	1,500	.....	[1]1,500
Cities Service Oil Co. (Del.):													
Ponca City	33,500	35,000	10,500	[1]2,500 [6]1,600	[1]23,000	40.0	[11]6,000	.....	.....	.....	.....	100	.....
Continental Oil Co.:													
Ponca City	62,000	65,000	10,800	[1]6,500 [2]4,000 [5]12,500	[2]33,500	43.0	[5]5,100 [13]11,000	[14]6,000	[2]5,000	[2]700	2,250	430	.....
D-X Sunray Oil Co.:													
Duncan	42,500	43,000	16,000	[5]11,000	[1]28,000	20.0	[1]6,000	.....	[2]3,500	[2]750	.....	400	.....
West Tulsa	74,000	75,000	24,000	[5]8,500	[1]35,000	18.0	[1]7,500	.....	[1]2,300	[2]2,000	6,500	300	[2]1,000
Franklin, Ben, Refining Co.:													
Ardmore	12,000	12,200	5,600	[1]2,400	[1]12,000	46.0	.....	.....	[2]1,000	[2]500	.....	.....	[1]1,200
Kerr-McGee Oil Industries, Inc.:													
Cushing	20,000	21,500	3,500	[2]7,000	[1]10,500	29.0	.....	.....	.....	[2]400	900	.....	[1]400 [3]1,000
Wynnewood	15,600	16,500	4,800	.....	[1]9,365	40.0	[1]5,500	[1]4,000	.....	[2]400	.....	.....	[1-2]2,500
Midland Cooperatives, Inc.:													
Cushing	12,145	12,500	.....	[2]5,500	[1]8,500	44.0	[1]2,580	.....	.....	[2]700	.....	.....	.....
Phillips Petroleum Co.:													
Okmulgee	19,000	(†)	8,000	.....	[2]10,000	30.0	.....	.....	.....	[2]700	.....	.....	.....
Texas Co., The:													
West Tulsa	35,000	(†)	*12,000	[*1]9,000 [*3]5,000	[*1]15,000	(‡)	[*1]8,000	[*1]8,000	.....	[*2]1,500	.....	.....	.....
Total†	380,995	396,300	17,800	82,500	212,565	.....	60,480	29,900	13,300	9,600	11,150	1,230	(¶)

¶Asphalt totals: (1) 5,800; (2) 2,500; (3) 1,000; (1-2) 2,500.

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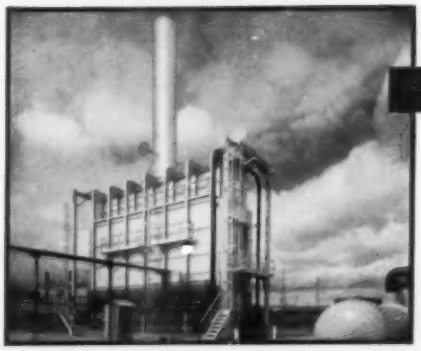

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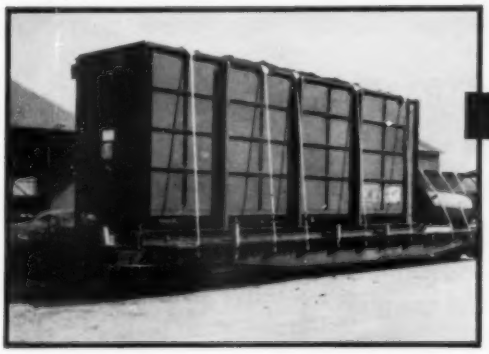

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Paris 17, France

Company and location	Crude capacity B.P.C.D.	Crude capacity B.P.S.D.	Charge, bbl. per stream day: Vacuum dist.	Thermal operations	Cat cracking: Total feed	Cat cracking: Per cent recycle	Catalytic reforming	Hydro. treating	Production, bbl. per stream day: Alkylation	Polymerization	Lubes	Coke (tons)	Asphalt
Oregon													
American Bitumuls & Asphalt Co.:													
Portland (Willbridge)	3,500	6,500	6,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	[1]4,200 [2]900 [3]1,150
Pennsylvania													
Atlantic Refining Co.:													
Philadelphia	148,000	156,000	45,000	.....	[1]63,000	40.0	[5]29,000	[1]15,000	*[1]5,400	*[2]1,700	*[5]5,000	.....	*[1]7,500 *[2]1,500
Franklin Refinery, Div. of L. Sonneborn Sons, Inc.:													
Franklin	2,000	2,000	.....	.....	.....	.....	.....	.....	.....	.....	500	.....	.....
Gulf Oil Corp.:													
Philadelphia	183,000	192,000	82,000	[2]24,000 [3]12,000	[1]90,000	32.0	[1]16,000	[5]50,000	[1]6,800	[2]3,600	.....	.....	.....
Kendall Refining Co.:													
Bradford	4,800	5,200	.....	.....	.....	.....	[1]1,500	[2]2,000	.....	.....	1,200	.....	.....
Pennsylvania Refining Co.:													
Karns City	1,500	1,500	600	.....	.....	.....	.....	.....	.....	.....	400	.....	.....
Pennzoil Div., South Penn Oil Co.:													
Rouseville	10,000	10,400	3,600	.....	[1]3,600	10.0	[2]2,900	[1]3,650	.....	[2]380	2,500	.....	.....
Quaker State Oil Refining Corp.:													
Emlenton	2,540	3,000	1,500	[1]750 [3]600	.....	.....	[1]1,000	.....	.....	[2]75	1,700	.....	.....
Farmers Valley	3,810	4,500	.....	[1]1,350	.....	.....	[1]1,500	.....	.....	[2]100	2,300	.....	.....
Sinclair Refining Co.:													
Marcus Hook	114,000	120,000	71,000	[1]5,000 [2]27,000	[1]45,000	20.0	[5]18,000	[1]10,000	.....	[2]1,850	.....	.....	.....
Sun Oil Co.:													
Marcus Hook	160,000	(†)	.....	*[2]12,000	*[2]20,000 *[3]30,000 *[4]48,500	(‡) (‡) (‡)	*[4]32,000	.....	*[2]7,000	.....	*[1]1,800	.....	*[1]800
United Refining Co.:													
Warren	7,600	8,000	2,500	.....	[1]5,500	54.5	[5]2,600	[1]750	.....	[2]225	1,000	.....	[2]500
Valvoline Oil Co., Div. Ashland Oil & Refining Co.:													
Freedom	5,500	6,000	2,000	.....	.....	.....	.....	.....	.....	.....	800	.....	.....
Wolf's Head Oil Refining Co., Inc.:													
Reno	2,500	2,595	.....	.....	[1]920	.....	.....	.....	.....	.....	750	.....	.....
Total†	645,250	679,195	208,200	84,000	317,320	.....	108,000	81,400	20,500	8,130	29,850	.....	(¶)

¶Asphalt totals: (1) 9,200; (2) 2,200.

Rhode Island													
Socony Mobil Oil Co., Inc.:													
East Providence	6,000	6,300	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	[1]4,000
Texas Co., The:													
Providence	3,500	(†)	*1,750	.....	.....	.....	.....	.....	.....	.....	.....	.....	[1-2-3]1,500
Total†	9,500	10,000	1,800	.....	.....	.....	.....	.....	.....	.....	.....	.....	(¶)

¶Asphalt totals: (1) 4,000; (1-2-3) 1,700.

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There are now about fifty processes for producing higher octane motor fuels. One of them is best for you; but which one? Spinning a wheel won't locate it. Why not have a talk with a Treco representative?

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TRECO

A DIVISION of VITRO CORPORATION of AMERICA

The REFINERY ENGINEERING Company

NEW YORK TULSA TORONTO

Company and location	Crude capacity B.P.C.D.	Crude capacity B.P.S.D.	Charge, bbl. per stream day: Vacuum dist.	Thermal operations	Cat cracking: Total feed	Cat cracking: Per cent recycle	Catalytic reforming	Hydro. treating	Production, bbl. per stream day: Alkylation	Polymerization	Lubes	Coke (tons)	Asphalt
South Carolina													
Esso Standard Oil Co.:													
Charleston	8,000	8,700	6,800	.....	.....	.....	.....	.....	.....	.....	.....	.....	[1]4,350 [2]250
Tennessee													
Delta Refining Co.:													
Memphis	11,400	12,000	5,000	.....	[2]5,000	20.0	.....	.....	.....	[2]400	.....	.....	.....
Southern Oil Service:													
Nashville	300	800	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total	11,700	12,800	5,000	.....	5,000	.....	.....	.....	.....	400	.....	.....	.....
Texas													
American Oil Co.:													
Texas City	145,000	157,000	27,000	[1]28,000 [2]25,500 [3]10,500	[1]68,000	3.0	[5]21,000	[3]23,000	[1]9,000	[2]3,000	.....	.....	[1]5,000
American Petrofina Co. of Texas:													
Mount Pleasant	19,000	20,000	12,000	.....	[2]10,000	15.0	.....	.....	.....	[2]550	.....	.....	[1]5,200 [2]1,000 [3]1,400
Wichita Falls	10,500	11,500	.....	[6]2,600	[1]3,600	20.0	[1]3,000	.....	.....	[2]250	.....	.....	.....
Atlantic Refining Co.:													
Port Arthur	62,000	65,000	19,000	.....	[1]31,000	30.0	[6]23,000	.....	.....	[*2]150	.....	.....	.....
Bryson Pipeline & Refining Co.:													
Bryson	2,000	2,000	.....	.....	.....	.....	.....	.....	.....	.....	190	.....	.....
Cactus Petroleum Co., Inc.:													
Brownsville	7,500	7,500	5,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	[1]3,500
La Blanca	3,500	3,500	.....	.....	.....	.....	[6]1,000	.....	.....	.....	.....	.....	.....
Col-Tex Refining Co.:													
Colorado City	10,500	11,000	7,000	[1]3,500	.....	.....	[1]1,800	[1]1,800	.....	[2]100	.....	.....	[1]3,000
Continental Oil Co.:													
Wichita Falls	8,000	8,000	.....	[1]4,100 [3]1,350	.....	.....	[15]3,500	.....	.....	[1]550 [2]200	.....	.....	.....
Cosden Petroleum Corp.:													
Big Spring	29,400	31,000	15,500	[1]7,500	[1]14,800	14.0	[1]4,500 [11]4,000	[1]2,100	[2]4,200	[2]400	.....	.....	[1]3,500 [2]350 [3]1,000
Crown Central Petroleum Corp.:													
Houston	35,150	37,000	.....	[1-2]8,500	[2]16,000	25.0	[4]5,500	[7]5,500	.....	.....	.....	.....	.....
Danaho Refining Co.:													
Pettus	5,000	5,000	.....	[1]1,000	.....	.....	[1]1,000	.....	.....	[1]50	.....	.....	.....
Delhi-Taylor Oil Corp.:													
Corpus Christi	40,000	42,000	.....	[2]2,400	[2]12,000	25.0	[1]15,000	[1]14,000	.....	[2]500	.....	.....	.....
Delhi-Taylor Oil Corp. and Mayfair Minerals, Inc.:													
Port Isabel	15,000	15,800	.....	.....	.....	.....	[1]4,000	.....	.....	.....	.....	.....	.....
Eastern States Petroleum & Chemical Corp.:													
Houston	63,000	65,000	25,000	[2]20,000	[1]20,000	17.0	[1]12,000	[1]32,000	[1]4,500	.....	.....	.....	.....

REFINERY SURVEY (TEXAS Continued)

Company and location	Crude capacity B.P.C.D.	Crude capacity B.P.S.D.	Charge, bbl. per stream day: Vacuum dist.	Charge, bbl. per stream day: Thermal operations	Charge, bbl. per stream day: Cat cracking: Total feed	Charge, bbl. per stream day: Cat cracking: Per cent recycle	Charge, bbl. per stream day: Catalytic reforming	Charge, bbl. per stream day: Hydro. treating	Production, bbl. per stream day: Alkylation	Production, bbl. per stream day: Polymerization	Production, bbl. per stream day: Lubes	Production, bbl. per stream day: Coke (tons)	Production, bbl. per stream day: Asphalt
Eddy Refining Co.:													
Houston	2,000	2,100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Flint Chemical Co.:													
San Antonio	230	230	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gratex Corp.:													
Graham	500	500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gulf Oil Corp.:													
Port Arthur	270,000	287,000	121,000	[2]23,500 [3]23,000	[1]125,000	27.0	[1]29,000	[5]50,000	[1]8,000	[2]6,000	13,000	.....	.....
Howell Refining Co.:													
Corpus Christi	4,800	5,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
San Antonio	2,900	3,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Humble Oil & Refining Co.:													
Baytown	282,000	310,100	(‡)	[1]16,500 [2]19,500	[1]109,000	(‡)	[5]46,000	[2]115,500	[1]13,000	[2]4,200	19,500	.....	[1-2-3]2,900
LaGloria Oil & Gas Co. (formerly McMurrey Refining Co.):													
Tyler	17,500	18,500	.....	[1]4,500 [5]10,000	[1]10,000	20.0	[1]5,000	.....	[1]2,200	[2]700	.....	100	.....
Magnolia Petroleum Co.:													
Beaumont	205,000	221,000	49,000	[2]56,500 [3]10,000	[2]100,000	15.0	[7]16,000 [9]21,000	.....	[1]6,300	[1]800	6,400	.....	.....
Monarch Refining Co.:													
San Antonio	2,500	2,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Phillips Petroleum Co.:													
Phillips	71,000	(†)	17,000	.....	[1]40,000 [5]11,000	5.0	[1]16,000	[14]10,000	[2]8,500	[2]750	.....	.....	.....
Sweeny	95,000	(†)	17,000	.....	[1]30,000	20.0	[1]16,000	.....	[2]5,500	.....	.....	.....	.....
Phoenix Refining Co.:													
San Antonio	3,500	3,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Pontiac Refining Corp.:													
Corpus Christi	44,600	47,000	7,000	.....	[1]6,300	23.0	[1]12,000	.....	.....	[2]600	.....	.....	.....
Premier Oil Refining Co.:													
Baird	2,350	2,500	.....	[1]1,200	.....	.....	.....	.....	.....	.....	.....	.....	.....
Fort Worth	7,900	8,000	1,700	[8]2,200	[1]5,700	47.0	[1]1,700	.....	.....	[2]290	.....	.....	.....
Longview	4,800	5,000	.....	[1]2,500	.....	.....	[1]1,500	[1]1,500	.....	[2]90	.....	.....	.....
Pure Oil Co.:													
Nederland	78,900	(†)	20,000	[1]10,500	[1]27,500 [2]20,000	27.0 14.5	[5]15,000	§20,000	[1]2,850	[2]825	2,000	.....	.....
Rado Refining Co.:													
McAllen	1,500	1,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Republic Oil Refining Co.:													
Texas City	42,700	45,000	20,000	.....	[1]20,000	15.0	[1]7,200	.....	.....	[2]2,000	.....	.....	.....
Shamrock Oil & Gas Corp.:													
Sunray	20,000	21,000	6,000	[1]3,850	[3]13,500	12.0	[1]2,500	[5]5,500	[1]2,600	.....	.....	.....	[1]825
Shell Oil Co.:													
Houston	125,000	132,000	42,000	[3]13,000 [8]32,500	[1]42,000	.....	[1]32,500	[8]17,000	[1]4,900	.....	3,800	.....	[1]1,700
Sinclair Refining Co.:													
Corpus Christi	29,000	30,500	.....	[1]7,000 [3]3,000	[4]15,000	20.0	.....	.....	[2]1,700	.....	.....	.....	.....
Houston	138,000	145,300	43,000	[1]40,000 [2]14,000	[1]50,000 [2]11,000	20.0 9.0	[8]26,000	[11]51,000	[1]2,400	.....	4,250	.....	.....

REFINERY SURVEY (TEXAS Continued)

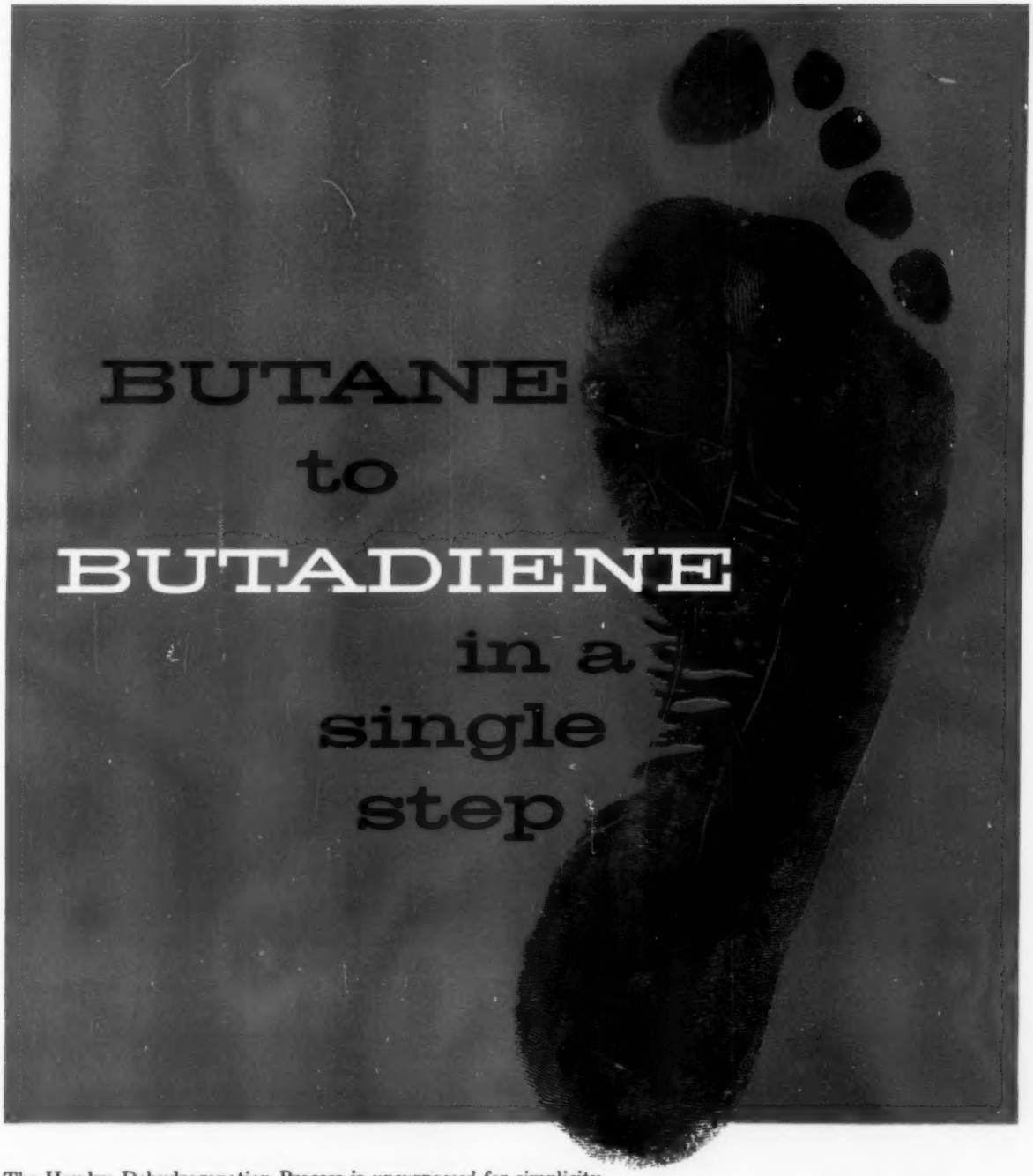
Company and location—	Crude capacity B.P.C.D.	Crude capacity B.P.S.D.	Charge, bbl. per stream day: Vacuum dist.	Thermal operations	Cat cracking: Total feed	Cat cracking: Per cent recycle	Catalytic reforming	Hydro. treating	Production, bbl. per stream day: Alkylation	Polymerization	Lubes	Coke (tons)	Asphalt
Skelly Oil Co.:													
Longview	4,500	5,000		[1]3,300			[1]1,500			[2]100			
Southwestern Oil & Refining Co.:													
Corpus Christi	45,000	50,000	8,000		[1]9,300	10.0	[1]10,000			[2]700			[1]3,000
Standard Oil Co. of Texas:													
El Paso	61,000	67,000	24,600	[9]9,000	[1]27,000 [3]15,000	50.0 30.0	[1]5,500		[1]1,600	[2]2,025			
Suntide Refining Co.:													
Corpus Christi††	75,000	76,000	24,500		[1]30,000	55.0	[11]15,000	[1]7,500	[2]3,000	[2]1,500			
Texas Asphalt & Refining Co.:													
Pasadena	5,000	5,000	4,000										[1]4,000
Texas-Calgary Co.:													
Carrizo Springs	1,500	2,000											
Texas City Refining, Inc.:													
Texas City	34,000	35,000		[2]5,000	[3]17,000	7.0	[4]7,000		[2]2,700				
Texas Co., The:													
Amarillo	15,000	(†)		*[1]2,000 *[5]3,500	*[1]8,000	(‡)	*[1]4,500	*[1]4,500	*[1]800	*[2]400		*100	
El Paso	13,000	(†)		*[1]2,000 *[5]3,500	*[1]7,000	(‡)	*[1]3,500	*[1]3,500		*[2]500		*100	
Port Arthur	230,000	(†)	*60,000	*[1]109,000 *[3]17,500 *[6]7,000	*[1]60,000	(‡)	*[1]40,000	*[1]40,000	*[1]12,000	*[2]1,800	*17,000	*200	
Port Neches	40,000	(†)	*22,000										*[1-2-3]9,000
Texas Gas Corp.:													
Winnie	**7,000	**7,000					[2]2,500						
Three Rivers Refinery:													
Three Rivers	1,500	1,500	500								750		[2]150
Tydal Co.:													
Gainesville	2,000	2,000									200		
Wickett Refining Co.:													
Wickett	3,500	3,500											
Total†	2,445,230	2,607,330	602,200	555,900	993,000		441,500	409,700	97,150	29,350	68,990	500	(¶)

¶Asphalt totals: (1) 29,725; (2) 1,500; (3) 2,400; (1-2-3) 12,900. §Unit designed and built by R. M. Parsons Co. **Charge stock comprises natural gasoline and cycle product. ††Manufactures 200 bbl. per stream day of odorless mineral spirits, and operates a 7,500-bbl. BTX Udex extraction unit.

Utah

Company and location—	Crude capacity B.P.C.D.	Crude capacity B.P.S.D.	Charge, bbl. per stream day: Vacuum dist.	Thermal operations	Cat cracking: Total feed	Cat cracking: Per cent recycle	Catalytic reforming	Hydro. treating	Production, bbl. per stream day: Alkylation	Polymerization	Lubes	Coke (tons)	Asphalt
Phillips Petroleum Co.:													
Woods Cross	12,500	(†)	3,000		[2]10,000	45.0				[2]400			[1]1,200
Salt Lake Refining Co.:													
Salt Lake City	41,000	43,000	27,000		[1]8,000 [3]13,000	50.0 25.0	[1]6,000						
Sure-Seal Corp.:													
Woods Cross	665	700	700										
Uinta Oil Refining Co.:													
Jensen	1,500	1,700											
Utah Oil Refining Co.:													
Salt Lake City	30,000	30,500		[1]7,000	[1]17,000		[5]5,500		[1]3,500	[2]700	120		[1]800 [3]1,200
Western States Refining Co.:													
North Salt Lake	3,200	3,200		[1]1,500			[4]1,000	[7]1,000					
Total†	88,865	93,000	30,700	8,500	48,000		12,500	1,000	3,500	1,100	120		(¶)

¶Asphalt totals: (1) 2,000; (3) 1,200.



The Houdry Dehydrogenation Process is *unsurpassed* for simplicity and flexibility in transforming through a *one-step process*—

- Butane to Butadiene or Butenes
- Isobutane to Isobutene
- Butenes to Butadiene
- Other light hydrocarbons to mono- and di-olefins

- Since 1955 more than 300,000 annual tons of Houdry butadiene capacity has been licensed. • All new U.S. butadiene plants placed on stream since the major expansion of the synthetic rubber industry started in 1955 have been Houdry-designed and -licensed.

Houdry Dehydrogenation Catalysts are unsurpassed, too, for stability and selectivity in single-step olefin production.

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These men and women make the profit-creating decisions for going, growing businesses . . . textiles, petroleum products, paper, metals, plastics, food, glass, soap, foils and wraps, chemicals, pharmaceuticals, cosmetics, rubber goods, disinfectants and cleansers. A vital part of their jobs is spotting and applying new trends in materials selection, processing, and handling that produce better goods at lower cost.

The versatile basic chemicals are deeply involved in the style changes continually reshaping almost all products and processes. Columbia-Southern, a leading producer of these essential industrial chemicals, can be a big help to your business as both supplier and technical adviser. Call Columbia-Southern with your next order. You'll soon see why Columbia-Southern chemicals, research, service, and technical assistance help shape profitable futures for products. The Columbia-Southern Chemical Corporation, One Gateway Center, Pittsburgh 22, Pennsylvania. Offices in principal cities. In Canada: Standard Chemical Limited.

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KOH—Caustic Potash • CCl_4—Carbon Tetrachloride • NH_3—Anhydrous Ammonia

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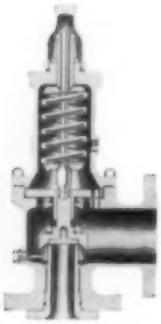

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Consolidated Ashcroft Hancock Division • Tulsa, Oklahoma
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REFINERY SURVEY

Company and location	Crude capacity B.P.C.D.	Crude capacity B.P.S.D.	Charge, bbl. per stream day: Vacuum dist.	Thermal operations	Cat cracking: Total feed	Cat cracking: Per cent recycle	Catalytic reforming	Hydro. treating	Production, bbl. per stream day: Alkylation	Polymerization	Lubes	Coke (tons)	Asphalt
Virginia													
American Oil Co.:													
Yorktown	33,000	35,000	19,000	[5]9,600	[1]30,600	30.0	[5]7,600	[3]22,600	.....	[2]2,500	.....	600	.....
Washington													
American Bitumuls & Asphalt Co.:													
Richmond Beach	1,000	3,500	3,500	.....	.....	.....	.....	.....	.....	.....	.....	.....	[1]2,600
General Petroleum Corp.:													[2]1,500
Ferndale	35,000	37,000	10,000	[2]6,600	[2]20,000	40.0	[9]15,000	.....	.....	[2]1,200	.....	.....	.....
Shell Oil Co.:													
Anacortes	55,000	57,800	20,000	.....	[1]33,000	§33.0	[1]8,500	[8]8,500	.....	[2]4,000	.....	.....	.....
Union Oil Co. of California:													
Edmonds	4,000	5,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	[1]3,500
U. S. Oil & Refining Co.:													[2]600
Tacoma	10,000	11,700	.....	2,000	.....	.....	[4]2,500	[1]2,500	.....	[2]100	.....	.....	.....
Total	105,000	115,000	33,500	8,600	53,000	.....	26,000	11,000	.....	5,300	.....	.....	(¶)

¶Asphalt totals: (1) 6,100; (2) 2,100. §Two-stage unit, fresh feed to first stage 22,000 bbl.; first stage product to second stage 11,000; no second stage recycle.

West Virginia													
Elk Refining Co.:													
Flat Rock	4,200	4,500	2,000	[1]800	.....	.....	[1]1,500	[1]500	.....	[2]80	1,000	.....	.....
Quaker State Oil Refining Co.:													
St. Marys	2,371	2,800	.....	[1]750 [3]600	.....	.....	[1]1,000	.....	.....	[2]75	600	.....	.....
Total	6,571	7,300	2,000	2,150	.....	.....	2,500	500	.....	155	1,600	.....	.....
Wisconsin													
Empire Petroleum Co.:													
Sheboygan	5,000	5,500	4,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	[1]2,200
Lake Superior Refining Co.:													
Superior	12,000	12,500	1,800	[1]1,500	.....	.....	[1]2,500	[1]3,000	.....	.....	.....	.....	[1]1,080
Total	17,000	18,000	5,800	1,500	.....	.....	2,500	3,000	.....	.....	.....	.....	[1]3,280
Wyoming													
Big D Oil Co. (former Crook County Refinery):													
Sundance	125	125	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Big Horn Refining Co.:													
Lovell	5,500	6,500	4,200	.....	[5]750	15.0	.....	.....	.....	.....	.....	.....	[1]2,200
C & H Refinery:													
Lusk	200	200	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Empire State Oil Co.:													
Thermopolis	5,000	5,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Frontier Refining Co.:													
Cheyenne	19,000	19,500	7,250	[1]1,000	[1]9,000	10.0	[1]2,500	[1]3,500	.....	[2]800	.....	.....	[1]2,200

REFINERY SURVEY (WYOMING Continued)

Company and location	Crude capacity B.P.C.D.	Crude capacity B.P.S.D.	Charge, bbl. per stream day: Vacuum dist.	Thermal operations	Cat cracking: Total feed	Cat cracking: Per cent recycle	Catalytic reforming	Hydro. treating	Production, bbl. per stream day: Alkylation	Polymerization	Lubes	Coke (tons)	Asphalt
Husky Oil Co.:													
Cody	6,700	7,200	4,000	.....	.....	.....	[6]1,200	[1]1,000	.....	.....	.....	.....	[1]4,000 [2]1,000
Sinclair Refining Co.:													
Sinclair	24,000	25,300	9,000	[1]2,000 [3]2,000	[1]12,500	20.0	.....	.....	[1]1,700	[2]350	.....	.....	[1]1,000
Sioux Oil Co.:													
Newcastle	4,000	4,300	.....	[1]2,000	.....	.....	[4]750	.....	.....	[2]50	.....	.....	.....
Socony Mobil Oil Co., Inc.:													
Casper	11,500	12,200	.....	[1]1,700	[2]8,300	50.0	[9]3,300	[6]7,560	.....	[2]400	.....	.....	[1]1,500
Standard Oil Co. (Ind.):													
Casper	17,000	21,000	11,800	[1]4,450 [6]2,500	[1]8,750	4.0	[5]3,750	.....	[1]800	.....	760	118	[1]700 [2]50 [3]2,000
Texas Co.:													
Casper	17,000	(†)	[8]9,000	[8]4,000	[8]16,000	(‡)	[8]14,000	[8]14,000	.....	[8]2500	.....	[8]100	[8][1-2-3]1,400
Total†	110,025	119,225	45,750	20,050	46,000	.....	15,900	16,460	2,500	2,200	760	218	(¶)

¶Asphalt totals: (1) 11,600; (2) 1,050; (3) 2,000; (1-2-3) 1,600.

Puerto Rico

Caribbean Refining Co.:													
Bayamon	12,825	13,500	9,000	.....	[1]13,100	43.0	.....	.....	.....	[2]500	.....	.....	.....
Commonwealth Oil Refining Co., Inc.:													
Guayanilla	52,900	58,800	34,500	.....	[3]53,000	50.0	[4]7,460	[7]7,460	[1]1,425	[3]2,500	.....	.....	.....
Total	65,725	72,300	43,500	.....	66,100	.....	7,460	7,460	1,425	3,000	.....	.....	.....

Operating plants making petroleum products, but not charging whole crude

Asphalt

Byerlite Corp., Heath, Ohio: 2,000 bbl. per day of straightrun; 5,200 bbl. per day of oxidized.

Lunday-Thagard Oil Co., South Gate, Calif.: 1,700 bbl. per day of oxidized.

Monarch Refineries, Inc., Oklahoma City: 2,000 bbl. per day of oxidized.

Pabco Building Materials Division, Fiberboard Paper Products Corp., Emeryville, Calif.: 3,000 bbl. per day of oxidized. At Portland, Ore.: 525 bbl. per day of oxidized.

Lubes and Waxes

Calumet Refining Co., Burnham, Ill.: 750 bbl. per day of lubes (1,200-bbl. per day crude unit shut down).

Cit-Con Oil Corp., Lake Charles, La.: 9,000 bbl. per day of lubes; 26,000 bbl. per day capacity vacuum unit charging topped crude scheduled to be expanded 2,000 bbl. by March 1, 1958.

Dallawax Co., Kilgore, Tex. 500 bbl. per day of wax from tank bottoms.

Petrolite Corp., Ltd., Kilgore, Tex.: 700 bbl. per day of wax from tank bottoms.

Ultra-Penn Refining Co., Bruin, Pa.: 100 bbl. per day of lubes.

Other

American Gilsonite Co., Gilsonite, Colo.: 3,850 bbl. per day delayed coking to produce 250 tons of coke; 1,000 bbl. per day Platforming and Unifining.

Calstate Refining Co., Long Beach, Calif.: 2,500 bbl. per day visbreaking; 1,000 bbl. Hyperformer shut down.

Great Western Producers, Inc., Irving, Tex.: 1,200-bbl. per day Sinclair-Baker cat reformer; 600-bbl. per day Arosorber.

Kerr-McGee Oil Industries, Inc., Cleveland, Okla.: 2,400 bbl. per day Platforming.

Report on Canadian Operating Refineries

Location and Capacities as of January 1, 1958

Province—	No. plants	Crude capacity B.P.C.D.	Crude capacity B.P.S.D.	Charge, bbl. per stream day: Vacuum dist.	Thermal operations	Catalytic cracking total feed	Catalytic reforming	Hydro-treating	Production, bbl. per stream day: Alkylation	Polymerization	Lubes	Coke (tons)	Asphalt* (1)	Asphalt* (2)	Asphalt* (1-2-3)
Alberta	11	83,300	91,240	19,050	25,800	25,300	15,025	10,075	830	2,760	....	125	6,700	1,700	920
British Columbia	5	74,150	77,400	30,380	5,240	29,400	12,850	3,800	....	5,410	....	....	4,700	....	630
Manitoba	4	32,630	34,700	12,160	1,375	16,990	4,400	.....	.....	507	.....	.....	.....	.....	220
New Brunswick	1	300	300	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Northwest Territories	1	1,300	1,600	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Nova Scotia	1	44,500	49,500	22,500	.....	34,000	6,900	.....	.....	5,000	.....	.....	.....	.....	940
Ontario	6	198,200	216,200	83,900	31,300	91,300	40,800	16,400	.....	2,660	4,420	24	4,600	1,520	2,200
Quebec	5	255,800	277,900	98,700	38,700	123,450	46,000	27,500	1,400	11,130	330	80	12,320	3,000	3,600
Saskatchewan	9	68,050	74,400	30,230	16,930	40,500	650	1,000	....	3,340	.....	100	5,300	470	210
Total	43	758,230	823,240	296,920	119,345	360,940	126,625	58,775	2,230	30,807	4,750	329	33,620	6,690	8,720

Legend for footnotes:
*Barrels for calendar day. †Province totals include crude capacities not reported, and calendar day figures converted to stream day. Factor used in converting crude capacity figures is 0.95; factor used in converting process is 0.90. ‡Not reported. ¶Asphalt totals reported thus: (1) straightrun; (2) oxidized; (1-2-3) combined straightrun, oxidized, and other.
Note: Legend for identifying types of processes is located at beginning of U. S. report of operating refineries.

Company and location—	Crude capacity B.P.C.D.	Crude capacity B.P.S.D.	Charge, bbl. per stream day: Vacuum dist.	Thermal operations	Cat cracking: Total feed	Cat cracking: Per cent recycle	Catalytic reforming	Hydro-treating	Production, bbl. per stream day: Alkylation	Polymerization	Lubes	Coke (tons)	Asphalt
Alberta													
Anglo-American Exploration, Ltd.:													
Hartwell	3,800	4,000	.....	[1-2]1,500	.....	.....	[6]1,000	.....	.....	[2]60	.....	.....	.....
Bonnyville Oil Refining:													
Bonnyville	1,000	1,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
British American Oil Co., Ltd.:													
Calgary	6,750	7,500	2,500	[1]2,500	.....	.....	[6]2,000	.....	.....	.....	.....	.....	[1]600 [2]300
Edmonton	7,650	8,500	.....	[1]1,400 [5]2,100	[4]4,000	50.0	[6]5,400	[15]6,300	.....	.....	.....	65	.....
Canadian Husky Oil, Ltd.:													
Lloydminster	7,900	8,500	2,100	.....	.....	.....	[14]400	.....	.....	.....	.....	.....	[1]3,200 [2]900
Excelsior Refineries, Ltd.:													
Lloydminster	3,550	4,000	2,350	.....	.....	.....	.....	.....	.....	.....	.....	.....	[1]2,000 [2]500
Imperial Oil, Ltd.:													
Calgary	6,750	7,940	.....	[1]5,400	.....	.....	.....	.....	[1]830	.....	.....	.....	[1-2-3]920
Edmonton	28,500	30,300	10,300	[1]6,700	[14]14,800	60.0	[10]2,350	[2]2,900	.....	[2]2,200	.....	.....	.....
McColl-Frontenac Oil Co., Ltd.:													
Edmonton	11,900	13,500	.....	[1]3,000 [5]2,200	[1]6,500	30.0	[1]3,000	.....	.....	[2]500	.....	60	.....
North Star Oil, Ltd.:													
Grande Prairie	2,100	2,500	.....	[1]1,000	.....	.....	[8]875	[12]875	.....	.....	.....	.....	.....

Company and location	Crude capacity B.P.C.D.	Crude capacity B.P.S.D.	Charge, bbl. per stream day: Vacuum dist.	Thermal operations	Cat cracking: Total feed	Cat cracking: Per cent recycle	Catalytic reforming	Hydro. treating	Production, bbl. per stream day: Alkylation	Polymerization	Lubes	Coke (tons)	Asphalt
Wainwright Producers & Refining, Ltd.:													
Wainwright	3,400	3,500	1,800	.....	.....	.....	.....	.....	.....	.....	.....	.....	[1]900
Total	83,300	91,240	19,050	25,800	25,300	.....	15,025	10,075	830	2,760	.....	125	(¶)
¶Asphalt totals: (1) 6,700; (2) 1,700; (1-2-3) 920.													
British Columbia													
Imperial Oil, Ltd.:													
Ioco	30,000	31,900	12,200	.....	[1]12,200	50.0	[10]6,300	.....	.....	[2]2,500	.....	.....	[1-2-3]630
Royalite Oil Co., Ltd.:													
Kamloops	4,750	5,000	2,180	.....	[1]2,200	35.0	.....	.....	.....	[2]110	.....	.....	[1]700
Shell Oil Co. of Canada, Ltd.:													
Vancouver (Shellburn plant)	19,500	20,500	8,000	[2]4,500	[1]6,000	5.0	[13]3,300	[13]3,300	.....	[2]400	.....	.....	[1]2,000
Standard Oil Co. of B. C., Ltd.:													
North Burnaby	18,000	18,000	8,000	.....	[1]9,000	50.0	[1]2,750	.....	.....	[2]2,400	.....	.....	[1]2,000
X-L Refineries, Ltd. (Pacific Petroleums, Ltd.):													
Dawson Creek	1,900	2,000	.....	[9]740	.....	.....	[1]500	[1]500	.....	.....	.....	.....	.....
Total	74,150	77,400	30,380	5,240	29,400	.....	12,850	3,800	.....	5,410	.....	.....	(¶)
¶Asphalt totals: (1) 4,700; (1-2-3) 630.													
Manitoba													
Anglo-Canadian Oils, Ltd.:													
Brandon	2,630	3,000	.....	[1]1,375	.....	.....	[1]1,000	.....	.....	[1]50	.....	.....	.....
Imperial Oil, Ltd.:													
Winnipeg	18,000	19,200	7,300	.....	[1]8,500	30.0	[10]3,400	.....	.....	.....	.....	.....	[1-2-3]220
North Star Oil, Ltd.:													
St. Boniface	11,500	12,000	4,860	.....	[1]8,490	45.0	.....	.....	.....	[2]457	.....	.....	.....
Radio Oil Refineries, Ltd.:													
East Kildonan	500	500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total	32,630	34,700	12,160	1,375	16,990	.....	4,400	.....	.....	507	.....	.....	[1-2-3]220
New Brunswick													
New Brunswick Oilfields, Ltd.:													
Weldon	300	300	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Northwest Territories													
Imperial Oil, Ltd.:													
Norman Wells	1,300	1,600	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Nova Scotia													
Imperial Oil, Ltd.:													
Halifax	44,500	49,500	22,500	.....	[13]4,000	80.0	[10]6,900	.....	.....	[2]5,000	.....	.....	[1-2-3]940
Ontario													
British American Oil Co., Ltd.:													
Clarkson	55,000	61,500	28,000	[7]4,500	[1]17,400	33.0	[6]10,000	[15]12,500	.....	[2]1,260	1,220	.....	[1]4,000 [2]1,300
Canadian Husky Oil, Ltd.:													
Fort William	3,800	4,000	1,300	.....	.....	.....	[6]1,000	.....	.....	.....	.....	.....	[1]600 [2]220
Canadian Oil Companies, Ltd.:													
Corunna	27,400	30,000	15,000	[3]3,500	[1]22,000	40.0	[1]8,900	.....	.....	[2]700	.....	.....	.....
Imperial Oil, Ltd.:													
Sarnia	77,000	81,900	29,600	[1]4,450 [2]4,450 [3]8,900	[1]29,200	40.0	[10]15,300	[3]3,900	.....	.....	3,200	24	[1-2-3]2,200

REFINERY SURVEY (ONTARIO Continued)

Company and location—	Crude capacity— B.P.C.D.	Crude capacity— B.P.S.D.	Charge, bbl. per stream day: Vacuum dist.	Thermal operations	Cat cracking: Total feed	Cat cracking: Per cent recycle	Catalytic reforming	Hydro. treating	Production, bbl. per stream day: Alkylation	Polymerization	Lubes	Coke (tons)	Asphalt
Regent Refining (Canada), Ltd.:													
Port Credit	20,000	23,000	10,000	[2]4,000 [3]1,500	[1]10,500	67.0	[1]2,300	.....	.....	[2]700	.....	.....	.....
Sun Oil Co., Ltd.:													
Sarnia	15,000	(†)	.....	.....	[*3]11,000	(‡)	[*4]3,000	.....	.....	.....	.....	.....	.....
Total†	198,200	216,200	83,900	31,300	91,300	.....	40,800	16,400	.....	2,660	4,420	24	(¶)

¶Asphalt totals: (1) 4,600; (2) 1,520; (1-2-3) 2,200.

Quebec

British American Oil Co., Ltd.:													
Montreal	45,000	50,000	17,000	.....	[1]25,000	20.0	[6]13,000	[15]15,500	.....	[2]630	330	.....	[1]9,000 [2]3,000
Canadian Petrofina, Ltd.:													
Montreal	20,000	21,500	9,700	[4]3,800	[3]18,000	50.0	[5]3,600	[9]3,000	[1]1,400	[2]500	.....	80	.....
Imperial Oil, Ltd.:													
Montreal East	71,800	78,900	39,000	[2]11,900	[1]25,450	20.0	[10]10,400	.....	.....	[2]5,500	.....	.....	[1-2-3]3,600
McColl-Frontenac Oil Co., Ltd.:													
Montreal East	59,000	(†)	.....	[2]14,000	[1]30,000	20.0	[1]12,000	.....	.....	[2]1,500	.....	.....	.....
Shell Oil Co. of Canada, Ltd.:													
Montreal East	60,000	62,000	33,000	[2]9,000	[1]25,000	6.0	[7]7,000	[9]9,000	.....	[2]3,000	.....	.....	[3]3,320
Total†	255,800	277,900	98,700	38,700	123,450	.....	46,000	27,500	1,400	11,130	330	80	(¶)

¶Asphalt totals: (1) 12,320; (2) 3,000; (1-2-3) 3,600.

Saskatchewan

British American Oil Co., Ltd.:													
Moose Jaw	[4]3,500	15,000	5,500	[1]1,500 [5]2,250	[1]10,000	55.0	.....	.....	.....	[2]390	.....	100	[1]1,200
Canadian Husky Oil, Ltd.:													
Moose Jaw	3,000	3,200	1,300	[2]1,300	.....	.....	[6]650	[10]1,000	.....	.....	.....	.....	[1]800 [2]220
Consumers Coop. Refineries, Ltd.:													
Regina	15,200	16,000	6,500	[2]3,000	[1]10,000	50.0	.....	.....	.....	[2]500	.....	.....	.....
Imperial Oil, Ltd.:													
Regina	22,500	25,600	10,700	[1]5,100	[1]15,300	66.0	.....	.....	.....	[2]2,200	.....	.....	[1-2-3]210
Northern Petroleums Corp., Ltd.:													
Kamsack	900	1,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	[1]200
Petroleum Fuels, Ltd.:													
Moose Jaw	1,100	1,100	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Prince Albert Refineries, Ltd.:													
Prince Albert	950	1,000	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	[1]300
Royalite Hi-Way, Ltd.:													
Saskatoon	6,150	6,500	2,380	[2]3,780	[1]5,200	50.0	.....	.....	.....	[2]250	.....	.....	[1]300
Royalite Oil Co., Ltd.:													
Coleville	4,750	5,000	3,850	.....	.....	.....	.....	.....	.....	.....	.....	.....	[1]2,500 [2]250
Total	68,050	74,400	30,230	16,930	40,500	.....	650	1,000	.....	3,340	.....	100	(¶)

¶Asphalt totals: (1) 5,300; (2) 470; (1-2-3) 210.

All types of processing, many states, share in refining industry's expansion plans

Here's the listing, as of January 1, 1958

A

• **Alaska-Yukon Refiners & Distributors, Ltd.,** will complete a $6,000,000, 7,500-bbl. plant at Haines, Alaska, in 1958. It will include a 2,500-bbl. thermal cracker.

• **American Oil Co.** will increase capacity of Ultraforming 21,000 bbl. and Hydrofining (Ind.) 22,000 bbl. at Texas City, Tex., February 1958. **Ralph M. Parsons Co.** has contract.

At El Dorado, Ark., crude capacity will be increased 5,000 bbl. March 1958.

At Savannah, Ga., crude capacity will be upped 1,100 bbl. and straightrun asphalt 830 bbl. in third quarter of 1958.

• **American Petrofina Co. of Texas** will add a 3,000-bbl. Platformer and a 1,500-bbl. hydrofluoric acid alkylation unit at Mount Pleasant, Tex., by October 1958. Cost will be $2,000,000 to $2,500,000. Contractor is **J. F. Pritchard & Co.**

• **Anderson-Prichard Oil Corp.** will add a 2,200-bbl. UOP hydrofluoric acid alkylation unit at Arkansas City, Kans., by November 1, 1958. **Refinery Engineering Co.** has contract.

• **Atlantic Refining Co.** will complete April 1958, a 2,100-bbl. sulfuric acid alkylation unit at Port Arthur, Tex. **Fluor Corp., Ltd.,** has contract.

At Philadelphia, a 20,000-bbl. visbreaker will be completed and capacity of vacuum unit charging topped crude increased 40,000 bbl. by **Badger Manufacturing Co.** in 1959.

• **Atlas Processing Co.** (bought by American Petrofina, Inc., early in 1958) will complete a 3,800-bbl. UOP Penex isomerization unit and a 5,000-bbl. pentane splitter at Shreveport, La., May 1958.

B

• **Bankline Oil Co.** will add a 4,000-bbl. Sinclair-Baker reformer and a 4,000-bbl. hydrodesulfurization unit at Bakersfield, Calif., by October 1958.

• **Bay Petroleum Corp.** is adding a 3,500-bbl. Sinclair-Baker reformer at Denver. **M. W. Kellogg Co.** scheduled completion for March 15, 1958.

• **Bay Refining Corp.** will increase crude capacity 12,000 bbl. at Bay City, Mich., in 1959.

• **Berry Refining Co.** is considering expansion plans at Gary, Ind.

• **Big West Oil Co. of Montana** will increase crude capacity 3,000 bbl., add vacuum capacity of 2,500 bbl. to charge topped crude, and add 450 bbl. straightrun asphalt by July 1, 1958, at Kevin, Mont. A 1,250-bbl. Unifiner will be completed May 1, 1958.

• **British American Oil Co., Ltd.,** will complete November 1958, a 20,000-bbl. plant at Port Moody, B. C. **Canadian Kellogg Co., Ltd.,** has contract for a 9,000-bbl. vacuum unit to charge topped crude, a 13,500-bbl. fluid cat cracker (33% recycle), a 4,000-bbl. Atlantic Catformer, a 1,000-bbl. sulfuric alkylation unit, and a 7,200-bbl. hydrogen treating unit.

At Moose Jaw, Sask., a 5,400-bbl. Catformer and a 6,300-bbl. hydrogen-treating unit will be added by late 1958, at a cost of $4,000,000.

• **British Petroleums, Ltd.,** plans a $30,000,000, 30,000-bbl. plant at Ville d'Anjou, Que., to include a 15,000-bbl. cat cracker, a 9,000-bbl. cat reformer, hydrogen treating, and alkylation.

C

• **California Oil Co.** will complete December 1958, a 10,000-bbl. UOP Platformer-Unifiner at Perth Amboy, N. J. **H. K. Ferguson Co.** will start construction spring 1958. By May 1958, Houdriflow capacity will be increased 2,000 bbl., and by Demember 1958, crude capacity will be upped 10,000 bbl., capacity of vacuum unit charging topped crude 5,700 bbl.

• **Cal-Mex Oil & Refining Co.** has let a $27,000,000 contract to **Ralph M. Parsons Co.** for a 20,000-bbl. plant near San Diego, Calif. Plant, to be completed early 1959, will include a cat cracker, cat desulfurizer, cat reformer, and sulfur-recovery unit.

• **Caminol Co.** will add a 1,300-bbl. Platformer at Hanford Calif., by May 15, 1958.

• **Canadian Husky Oil, Ltd.,** has indefinite plans for crude expansion at Lloydminster, Alta.

At Fort William, Ont., **Poole-Pritchard, Ltd.,** scheduled for completion February 1, 1958, a $700,000 crude-expansion program including construction of a Husky-developed 1,000-bbl. diesulformer.

At Moose Jaw, Sask., crude expansion plans are incomplete.

• **Canadian Oil Companies, Ltd.,** will increase capacity of crude unit 20,000 bbl. and vacuum unit charging topped crude 10,000 bbl. at Corunna, Ont., by August 1959. **Canadian Kellogg Co., Ltd.,** is contractor.

• **Canadian Petrofina, Ltd.,** will increase capacity at Montreal 50% to 30,000 bbl. by mid-1958. Cost will be $3,000,000.

• **Carter Oil Co.** will increase crude capacity at Billings, Mont., 8,000 bbl. and vacuum unit charging topped crude 5,000 bbl. by mid-1958, by modifying present facilities.

• **Champlin Oil & Refining Co.** has scheduled completion of a $2,000,000, 1,500-bbl. Phillips hydrofluoric acid alkylation unit at Enid, Okla., March 1958. **Badger Manufacturing Co.** has contract.

• **Chemoil Corp.** may build a new plant between New Orleans and Baton Rouge, La., with probable completion set for 1960; or may buy an existing plant to start operation July 1958 or January 1959.

• **Cit-Con Oil Corp.** scheduled for completion by March 1, 1958, an increase of 2,000 bbl. in capacity of vacuum unit charging topped crude, and an increase of 1,000 bbl. in lube production at Lake Charles, La.

• **Cities Service Oil Co., Ltd.,** will complete a $22,000,000 20,000-bbl.

plant at Bronte, Ont., southwest of Toronto, December 1958. **C. F. Braun & Co.** has contract for a 7,600-bbl. vacuum unit to charge topped crude, a 13,300-bbl. UOP fluid cat cracker, and a 3,110-bbl. Sinclair-Baker cat reformer.

• **Cities Service Oil Co. (Pa.)** will complete in 1958, a 14,000-bbl. asphalt plant to replace existing facilities at Linden, N. J.

• **Cities Service Refining Corp.** will increase fluid cat cracking from 135,000 bbl. to 145,000 bbl. (40.9% recycle) by February 1, 1958, and add 4,800 bbl. vapor-phase butane isomerization by June 1, 1958, at Lake Charles, La.

• **Clark Oil & Refining Corp.** will increase crude capacity 5,100 bbl., vacuum-unit charging topped crude 13,500 bbl., Platforming 1,000 bbl., and add 2,160 bbl. of straightrun asphalt at Blue Island, Ill., by February 1, 1958. By March 1, 1958, a 1,500-bbl. UOP hydrofluoric acid alkylation unit and an 18,000-bbl. UOP fluid cat cracker (58% recycle) will be added. **Dushell Engineering, Inc.,** engineered the alkylation unit which is being built by **Morrison Construction Co.** The cat cracker is being built by **Procon, Inc.**

• **Commerce Oil Refining Corp.** will complete July 1, 1959, a $48,000,000, 43,000-bbl. plant at Jamestown, R. I. It will include a 21,500-bbl. vacuum unit to charge topped crude, a 40,900-bbl. fluid cat cracker (50% recycle), a 10,000-bbl. Platformer, a 10,000-bbl. Unifiner, a 2,640-bbl. alkylation unit, 802 bbl. of catalytic polymerization capacity, 86 tons of sulfur, and 566 tons of coke. **Lummus Co.** handled some of the original process planning. **Fluor Corp., Ltd.,** has construction contract.

• **Commonwealth Oil Refining Co., Inc.** will increase crude capacity 16,200 bbl. and vacuum unit charging topped crude 8,500 bbl. by March 1959, at Guayanilla, Puerto Rico. By June 1959, a 20,000-bbl. visbreaker and a 4,700-bbl. Unifiner will be added.

• **Consumers' Cooperative Refineries, Ltd.,** will complete a 3,000-bbl. UOP delayed coker to produce 145 tons per day of coke (replacing present thermal cracking capacity) at Regina, Sask., by late 1958. **Fluor Corp. of Canada, Ltd.,** is contractor. Cost is $1,300,000.

• **Continental Oil Co.** will add 1,300 bbl. straightrun asphalt by May 1, 1958, at Billings, Mont.

• **Cooperative Refinery Association** will add a 2,500-bbl. UOP Platformer and a 3,000-bbl. UOP Unifiner at Phillipsburg, Kans., by March 1958, at a cost of $1,250,000. **Southwestern Engineering Co.** has contract.

At Coffeyville, Kans., **Refinery Engineering Co.** will complete a 1,200-bbl. UOP hydrofluoric acid alkylation unit June 1958, at a cost of over $1,000,000.

At Scottsbluff, Neb., capacity of crude unit will be upped 2,700 bbl. by March 1958, and Platformer 150 bbl. by August 1958.

D

• **Delta Refining Co.** will add a 1,000-bbl. hydrofluoric acid alkylation unit by February 1, 1958, at Memphis, Tenn.

• **Derby Refining Co.** will increase Thermofor capacity from 9,000 bbl. to 12,000 bbl. (36.6% recycle) at Wichita, Kans., by May 1958. Catalytic polymerization capacity will be upped 600 bbl., straightrun asphalt 2,200 bbl., and oxidized asphalt 220 bbl.

• **Douglas Oil Co. of California** will increase crude capacity to 5,000 bbl. at Paramount, Calif., in 1959.

• **D-X Sunray Oil Co.** will complete a 6,000-bbl. Unifiner at Duncan, Okla., in 1958. **Refinery Engineering Co.** has contract.

At West Tulsa, Okla., **Refinery Engineering Co.** will complete a 12,000-bbl. Platformer, a 20,000-bbl. Unifiner, a 3,000-bbl. hydrofluoric acid alkylation unit, and add 2,000 bbl. per day butane isomerization capacity by April 1958.

E

• **Elk Refining Co.** will increase Platforming 500 bbl. at Falling Rock, W. Va., by January 1, 1959. By March 1, 1958, Unifining will be upped 2,000 bbl.

• **El Paso Natural Gas Products Co.** will complete July 15, 1959, an 8,000-bbl. plant at Odessa, Tex. It will include a 2,936-bbl. vacuum unit to charge topped crude, a 3,520-bbl. fluid cat cracker (25% recycle), a 2,289-bbl. UOP Platformer, and a 1,249-bbl. hydrofluoric acid alkylation unit.

• **Esso Standard Oil Co.** will complete third quarter 1958, a 27,000-bbl. Powerformer as part of a $46,000,000 expansion program at Baton Rouge. A 10,000-bbl. Esso sulfuric acid alkylation unit will be completed September 1958 by **Foster Wheeler Corp.** A $750,000, 3,600-bbl. Esso fixed-bed Hydroformer will be completed January 1958 by **Ralph M. Parsons Co.** Catalytic polymerization will be upped 400 bbl. by May 1958, and gas oil cracking 5,000 bbl. by July 1958.

At Bayway, N. J., **Foster Wheeler Corp.** has contract for a 15,000-bbl. Hydrofiner.

At Linden, N. J., Esso Hydrofining will be increased 15,000 bbl. by April 1958.

At Charleston, S. C., crude capacity will be upped 4,300 bbl., vacuum unit charging topped crude 3,600 bbl., and straightrun asphalt 1,150 bbl. by March 1, 1958.

F

• **Farmers Union Central Exchange, Inc.,** will complete May 1958, a 4,400-bbl. naphtha Unifiner, a 7,100-bbl. middle distillate Unifiner, and a 4,450-bbl. Platformer at Laurel, Mont., at a cost of $3,000,000. **Refinery Engineering Co.** has contract for the three UOP units. In 1960, crude capacity will be increased 21,000 bbl.; a 3,300-bbl. delayed coker to produce 288 tons of coke per day will be added; fluid cat cracking will be upped 14,000 bbl. (2.1% recycle); catalytic polymerization will be increased 900 bbl.; straightrun asphalt will be increased 4,100 bbl. Capacity of vacuum unit charging topped crude will be increased 10,000 bbl. in 1958.

G

• **General Petroleum Corp.** will increase visbreaking capacity 2,500 bbl. by late 1958, at Torrance, Calif.

• **Gulf Oil Corp.,** will up Platforming capacity 26,000 bbl. at Port Arthur, Tex., by early 1958. **Procon, Inc.,** will complete a 10,000-bbl. pentane isomerization unit (Penex) by late 1958. Early in 1959 Platforming capacity will be increased another 12,000 bbl.

At Philadelphia, Platforming capacity will be increased 52,000 bbl. in early. 1958. Engineering and design are by **Universal Oil Products Co.** and **Procon, Inc.**

At Toledo, 2,000 bbl. of sulfuric acid alkylation will be added by February 1959, by **M. W. Kellogg Co.**

H

• **Hess Transport & Trading, Inc.,** plans a new plant at Port Reading, N. J.

• **Humble Oil & Refining Co.** will increase fluid cat cracking 5,000 bbl. by April 30, 1958, Hydrofining 6,000 bbl. by May 21, 1958, hydrodesulfurization 50,000 bbl. by February 1, 1958, and catalytic polymerization 1,400 bbl. by July 1, 1958, at Bay-

town, Tex. **Foster Wheeler Corp.** has contract for cat cracker. **Ralph M. Parsons Co.** has the hydrodesulfurization unit.

I

• **Imperial Oil, Ltd.,** is increasing crude capacity 14,700 bbl., at Calgary, Alta., as part of a $17,000,000 expansion and modernization program. **Canadian Bechtel, Ltd.,** will complete fall 1959, a 6,600-bbl. fluid cat cracker and a 2,700-bbl. Powerformer.

At Winnipeg, Man., **Foster Wheeler Corp.** will complete a 2,850-bbl. Powerformer early in 1958.

• **Irving Oil Co.** will build a 38,000-bbl. plant at St. Johns, N. B., to process imported crude. **Bechtel Corp.** has contract.

K

• **Kerr-McGee Oil Industries, Inc.,** will complete a 5,500-bbl. UOP Unifiner at Wynnewood, Okla., by July 1, 1958, at a cost of $4,000,000. **Refinery Engineering Co.** has contract.

At Cushing, Okla., **Litwin Engineering Co.** is studying alteration of a crude unit to increase capacity 7,000 bbl. A cat reformer will be added.

L

• **La Gloria Oil & Gas Co.** (formerly McMurrey Refining Co.) will increase Platforming capacity 5,200 bbl. and add a 3,200-bbl. Unifiner at Tyler, Tex., by June 1958. Crude capacity will be increased 6,500 bbl. and fluid cat cracking increased from 10,000 to 15,000 (40% recycle) by September 1, 1958. Delayed coking will be increased 4,000 bbl.

• **Leonard Refineries, Inc.,** will complete a $2,600,000, 13,000-bbl. UOP fluid cat cracker (43% recycle) at Alma, Mich., August 1958. In September 1958, an $800,000, 10,000-bbl. UOP hydrofluoric acid alkylation unit will be completed. **Ralph M. Parsons** has contract for both units.

• **Lion Oil Co.,** Div. Monsanto Chemical Co., will add by late 1958, a 5,000-bbl. combination hydrogen treater and cat reformer at El Dorado, Ark.

Lion possibly is considering a new plant 20 miles upriver from New Orleans.

M

• **McColl-Frontenac Oil Co., Ltd.,** will complete a 10,000-bbl. Texaco Hydrotreater at Montreal East early in 1958. **Foster Wheeler Corp.** has contract.

• **Magnolia Petroleum Co.** will complete a 100,000-bbl. atmospheric distillation unit and a 32,000-bbl. vacuum unit to charge topped crude (both to replace some existing capacities) at Beaumont, Tex., by August 1958. **Foster Wheeler Corp.** has contract for crude unit, and will also build a 30,000-bbl. Socony reformer by September 1958. Sulfuric acid alkylation capacity will be upped 8,000 bbl. by **C. F. Braun & Co.** by March 1958.

• **Mid-America Refining Co., Inc.,** will add 1,500 bbl. crude capacity and 400 bbl. asphalt capacity at Chanute, Kans., by March 15, 1958.

• **Midland Cooperatives, Inc.,** is building a $600,000 lube plant at Fridley, Minn.

N

• **Naph-Sol Refining Co.** will increase crude capacity 3,500 bbl. at Muskegon, Mich., by June 1958.

• **National Cooperative Refinery Association** will expand and modernize its plant at McPherson, Kans. **Refinery Engineering Co.** has contract to revamp crude, coking, and alkylation units by fall 1958. Crude capacity will be upped 11,000 bbl.

• **North American Petroleum Corp.** has bought site for a new plant at Corpus Christi, Tex., but plans are still in discussion stage.

• **North Star Oil, Ltd.,** plans to add a $1,000,000, 2,700-bbl. Platformer-Unifiner at St. Boniface, Man., by November 1, 1958.

• **Northwestern Refining Co.** will increase crude capacity 17,000 bbl. in 1959, and add a 6,000-bbl. cat reformer and an 8,000-bbl. hydrogenation unit in 1958, at St. Paul Park, Minn.

O

• **Ohio Oil Co.** will increase crude capacity 6,500 bbl., vacuum unit charging topped crude 2,350 bbl., delayed coking 1,000 bbl., fluid cat cracking 850 bbl. (30% recycle), Houdriforming 2,000 bbl., sulfuric acid alkylation 500 bbl., and coke 50 tons per day at Robinson, Ill., by October 1, 1958.

P

• **Pacific Cooperatives** is considering building a 15,000-bbl. plant at Vancouver, Wash. Preliminary plans include a cat cracker, coker, alkylation unit and possibly a cat reformer.

• **Pacific Petroleums, Ltd.,** will build a $500,000, 3,000-bbl. asphalt plant at Dawson Creek, B. C., by May 1958.

• **Pacific Petroleums, Ltd.,** and **Phillips Petroleum Co.** will complete February 1, 1958, at Taylor, B. C., a $15,000,000 plant to include distillation, cat desulfurization and reforming, dehydrogenation, butane isomerization, and alkylation. Pacific will operate plant.

• **Pana Refining Co.,** Div. of Illinois Farm Supply Co., will increase Platforming 800 bbl. and add 2,150-bbl. Unifining capacity by September 1, 1958, at Pana, Ill.

• **Phillips Petroleum Co.** will complete April 1958, a 3,600-bbl. UOP Platformer at Woods Cross, Utah. **Procon, Inc.,** has contract.

At Great Falls, Mont., asphalt capacity will be upped 100 bbl. by spring 1958.

At Okmulgee, Okla., 400-bbl. asphalt capacity will be added by spring 1958.

At Sweeny, Tex., Platforming capacity will be increased 16,000 bbl. by April 1958.

• **Pontiac Refining Corp.** has let contracts to **Fluor Corp., Ltd.,** for redesign and modification of a crude unit, and design and construction of a 5,000-bbl. Unifiner at Corpus Christi, Tex. Cost is $1,500,000.

R

• **Richfield Oil Corp.** plans a new $50,000,000 plant at Everett, Wash., probable completion set for 1965.

• **R. I. Refining Co.** plans a plant at Tiverton, R. I.

• **R. J. Oil & Refining Co., Inc.,** will increase capacity of crude unit 500 bbl., gas-oil cracking 200 bbl., Platforming 950 bbl., and add a 1,700-bbl. Unifiner at Princeton, Ind., by January 1, 1959.

• **Rothschild Oil Co.** is adding an 8,000-bbl. cat cracker at Santa Fe Springs, Calif., at a cost of $2,000,000. **C. F. Braun & Co.** is contractor. Platforming capacity will be increased 1,500 bbl.

• **Royalite Oil Co., Ltd.,** will complete in 1960 a $50,000,000, 20,000-bbl. separation plant to process Athabasca oil sands at Mildred Lake, Alta. **Caribou Engineering Co.** has contract.

At Kamloops, B. C., a 1,000-bbl. Platformer will be completed March 3, 1958.

S

• **Seminole Oil Co.** has indefinite, long-range plans, a $16,000,000, 15,000-bbl. plant at Fort Pierce, Fla., to be operated by Frontier Refining Co.

• **Shell Oil Co.** will complete mid-1958, a multimillion dollar 2,400-bbl. sulfuric acid alkylation unit at Anacortes, Wash. **Fluor Corp., Ltd.,** has contract.

At Wilmington, Calif., Platforming capacity will be upped 12,500 bbl.

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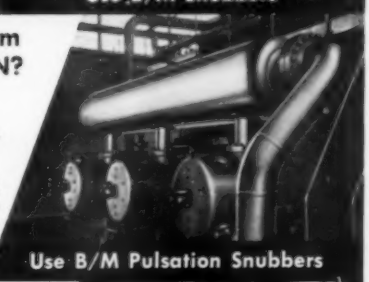

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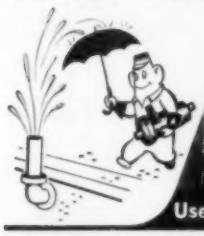

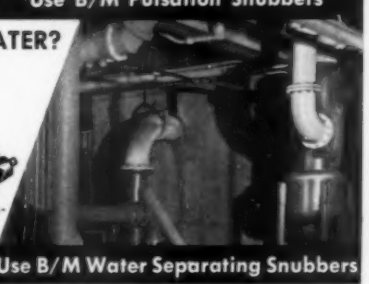

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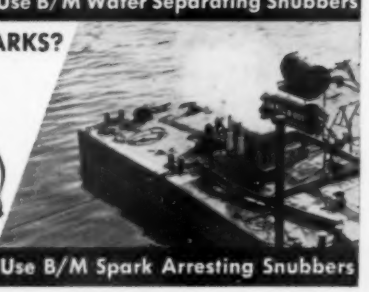

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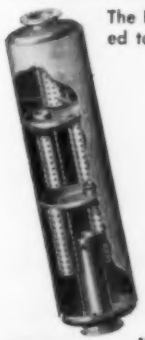

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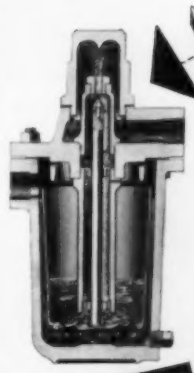

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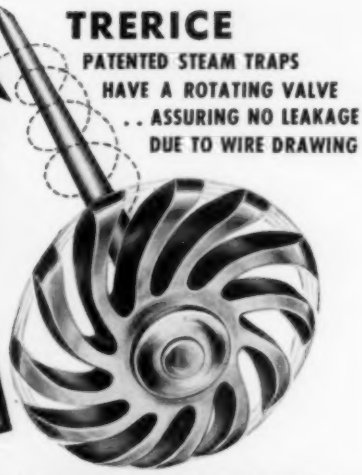

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by **Kaiser Engineers** by April 1958.

At Norco, La., a 16,000-bbl. UOP Platformer and a 16,000-bbl. Sinclair-Baker will be completed September 1958, by **Procon, Inc.** Auxiliary facilities will be built by **Foster Wheeler Corp.** and **J. F. Pritchard Co.**

• **Shell Oil Co. of Canada, Ltd.,** will add a $3,000,000, 1,500-bbl. hydrofluoric acid alkylation unit at Montreal East by May 1958. **Refinery Engineering, Ltd.,** is contractor.

At Bronte, Ont., near Toronto, a 20,000-bbl. plant will be completed in 1960.

• **Sinclair Refining Co.** will add a 1,200-bbl. Texaco MEK dewaxing and deoiling unit at East Chicago by October 1958. **Badger Manufacturing Co.** has contract.

At Corpus Christi, a 7,500-bbl. Sinclair-Baker cat reformer and a 7,500 Sinclair hydrogen-treating unit will be completed March 15, 1958.

• **Sioux Oil Co.** will up crude capacity 1,000 bbl., gas-oil cracking 1,000 bbl., and catalytic polymerization 50 bbl. at Newcastle, Wyo., by April 1, 1958.

• **Skelly Oil Co.** will complete a 3,500-bbl. Phillips hydrofluoric acid alkylation unit at El Dorado, Kans., summer 1958. Engineering and construction are by Skelly personnel.

• **Socony Mobil Oil Co., Inc.,** will complete early 1959, a 19,000-bbl. delayed coker at Paulsboro, N. J. **Lummus Co.** is contractor.

A Buffalo, N. Y., **M. W. Kellogg Co.** will complete an alkylation unit in early 1958.

• **Southland Co.** has bought site at Black Point, Fla., for a proposed $8,000,000, 15,000-bbl. plant.

• **Southeastern Refineries, Inc.,** plans a 5,000-bbl. plant at Savannah, Ga., to make asphalt from heavy imported crude. Cost is estimated at $1,900,000.

• **Standard Oil Co.** of California will build a $75,000,000, 60,000-bbl. plant at Mukilteo, a suburb of Everett, Wash.

At Bakersfield, Calif., a 5,500-bbl. Platformer and 5,500-bbl. Unifiner will be completed June 1958 by **Bechtel Corp.**

At Richmond, Calif., a 22,000-bbl. Platformer and 22,000-bbl. Unifiner will be completed July 1958 by **Bechtel, Corp.,** to replace existing facilities.

At Barbers Point, Oahu Island, Hawaii, site has been selected for a proposed plant.

• **Standard Oil Co. (Ind.)** will complete 1958, a 21,000-bbl. Ultraformer to replace present one, and add 21,000-bbl. Hydrofining at Whiting, Inc. **Ralph M. Parsons Co.** has contract. Vacuum unit charging topped crude will be increased 51,800 bbl., and present fluid cat cracker will be increased 10,900 bbl. by mid-1959. **Arthur G. McKee & Co.** will complete mid-1959, a 140,000-bbl. crude unit, the world's largest, to replace several smaller units.

At Wood River, Ill., **Arthur G. McKee & Co.** will complete in 1959, a 67,500-bbl. crude distillation unit and a 24,970-bbl. vacuum unit to replace existing unit. Fluid cat-cracking capacity will be upped to 47,000 bbl. (40% recycle).

At Mandan, N. D., a 1,630-bbl. Phillips hydrofluoric acid alkylation unit will be completed September 1958, by **Foster Wheeler Corp.**

At Neodesha, Kans., **Foster Wheeler Corp.** will complete early 1958, a 6,000-bbl. Ultraformer (Ind.).

• **Standard Oil Co. (Ohio)** will complete a $2,400,000, 3,500-bbl. sulfuric acid alkylation unit at Cleveland, May 1, 1958. **Arthur G. McKee & Co.** is prime contractor. Auxiliary facilities will cost $1,000,000.

At Toledo, work is under way to replace present crude, thermal and poly units. Crude capacity will be 60,000 bbl., vacuum-unit charging topped crude 23,000 bbl., poly 1,650 bbl., and delayed coking 8,000 bbl. to produce 350 tons of coke per day. Units being added include a 55,000-bbl. fluid cat cracker (45% recycle) a 12,000-bbl. Sinclair-Baker cat reformer, and a 22,500-bbl. Kellogg Hydrofiner. **M. W. Kellogg Co.** will complete the $40,000,000 project mid-1958.

• **Standard Oil Co. of Texas** will increase crude capacity 28,000 bbl., vacuum unit charging topped crude 13,200 bbl., add a 13,500-bbl. fluid cat cracker and a 2,025-bbl. catalytic polymerization unit at El Paso, Tex., by February 1958. **Fluor Corp., Ltd.,** has contract for the cat cracker.

• **Sun Oil Co.** will complete a 50,000-bbl. expansion of crude cracking and distillation facilities at Marcus Hook, Pa., in 1958. **Catalytic Construction Co.** is engineering the project.

• **Sunshine State Refineries, Ltd.,** plans to complete late 1959 or early 1960, a 25,000-bbl. plant at Plant City, Fla. It will include a 5,000-bbl. Platformer, a 10,000-bbl. Unifiner, a Thermofor, and an alkylation unit. **Kaiser Engineers** has design.

T

• **The Texas Co.** will complete a 40,000-bbl. plant at Anacortes, Wash., by January 1, 1959. It will include a 16,000-bbl. vacuum unit to charge topped crude, a 25,000-bbl. fluid cat cracker, a 7,000-bbl. Platformer, an 11,000-bbl. Hydrotreater, a 2,000-bbl. sulfuric acid alkylation unit, and a

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1,000-bbl. catalytic polymerization unit. General construction is by **Bechtel Corp.** Furnishing and erection of tankage is by **Chicago Bridge & Iron Co.**

At Port Arthur, Tex., crude capacity will be upped 20,000 bbl. and vacuum unit charging topped crude 32,000 bbl. by March 1, 1958. Fluid cat cracking will be increased 60,000 bbl. by May 1, 1958. **M. W. Kellogg Co.**

At Lockport, Ill., a 10,000-bbl. Unifiner is under construction.

At Wilmington, Calif., **Ralph M. Parsons Co.** will complete a 7,500-bbl. Udex unit by February 1959.

• **Tidewater Oil Co.** will complete a 22,500-bbl. Houdriformer at Avon, Calif., March 1958. **Bechtel Corp.** has contract.

U

• **Utah Oil Refining Co.** will increase capacity 5,200 bbl. at Salt Lake City, Utah, by mid-1958. **Fluor Corp., Ltd.,** has a $2,125,000 contract for a 35,700-bbl. pipe still to replace present facilities.

V

• **Vickers Petroleum Co., Inc.,** is studying plans for expansion of catalytic polymerization at Potwin, Kans.

W

• **Wainwright Producers & Refiners, Ltd.,** has let contract to **Ralph M. Parsons Co.,** for a 3,000-bbl. thermal cracker and a 1,000-bbl. Platformer at Wainwright, Alta.

• **West Branch Refineries, Inc.,** will complete April 1958, at West Branch, Mich., a 1,150-bbl. Houdriformer and a 1,150 Houdry-type hydrogen treater to pretreat reformer feed.

• **Western States Refining Co.** will increase crude capacity to 5,000 bbl. at North Salt Lake, Utah, by May 1, 1958.

• **Westland Oil Co.** will increase Platforming capacity 600 bbl. at Williston, N. D., by May 1958.

• **Wilshire Oil Co. of California** (bought early 1958 by Pontiac Western Corp., a subsidiary of Pontiac Refining Corp.) will complete in 1958, a 3,000-bbl. hydrofluoric acid alkylation unit, and add 2,500 bbl. butane isomerization at Norwalk, Calif.

X

• **X-L Refineries, Ltd.** (Pacific Petroleums, Ltd.), will add a 1,375-bbl. vacuum unit to charge topped crude and 335 bbl. straightrun asphalt by May 1958.

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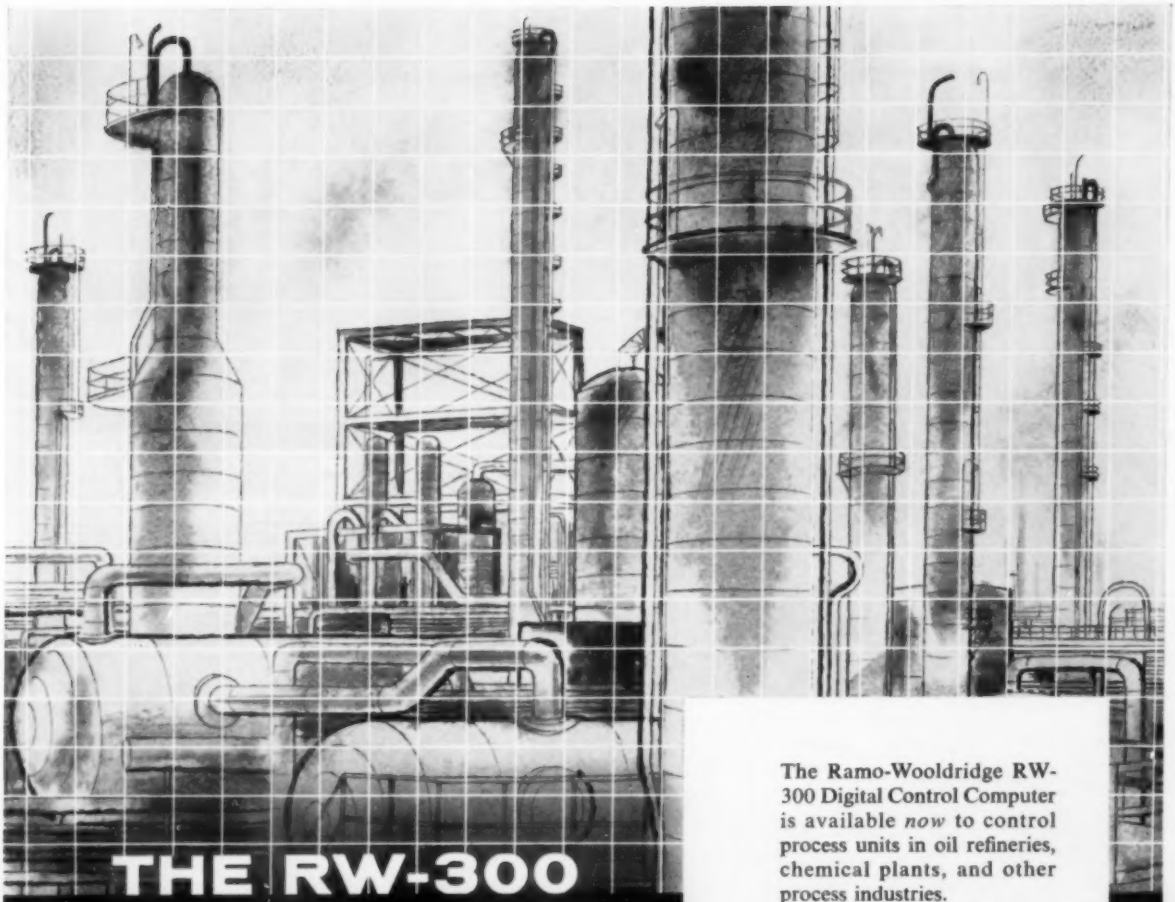
Shutdown Plants In United States

Company and location:	Cap., bbl. per stream day
California	
Superior Asphalt Co., Oxnard	2,000
Union Oil Co. of California (bought early 1958 by West Coast Asphalt Sales Co., Bakersfield	8,800
Illinois	
Harmony Oil Corp., Salem	2,500
Kentucky	
Aetna Oil Co., Div. Ashland Oil & Refining Co., Louisville	11,000
Louisiana	
Clark Oil & Refining Corp., Marrero	7,000
Montana	
Hunt, Eugene, Winnett	300
Independent Refinery, Missoula	
Modern Oil Co., Inc., Shelby	1,000
New Mexico	
El Paso Natural Gas Products Co., Bloomfield	2,500
El Paso Natural Gas Products Co., Prewitt	5,000
Ohio	
Western Reserve Refining Co., Div. Ashland Oil & Refining Co., Niles	6,000
Oklahoma	
Mercury Oil Refining Co., Oklahoma City	5,250
Wilcox Oil Co., Bristow	5,300
Texas	
Anderson Refining Corp. of Dallas, Palestine	3,400
Cosden Petroleum Corp., Hawley (In standby; may open late 1958)	6,500
Gladewater Refining Co., Gladewater	2,500
Richardson, Sid, Refining Co., Texas City	18,000
Wyoming	
Continental Oil Co., Glenrock	4,100
Pilot Oil Co., Morton	200



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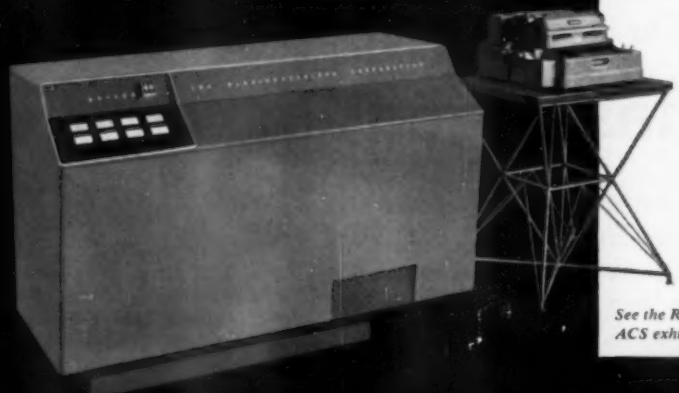
is the first digital computer for automatic process control and data logging



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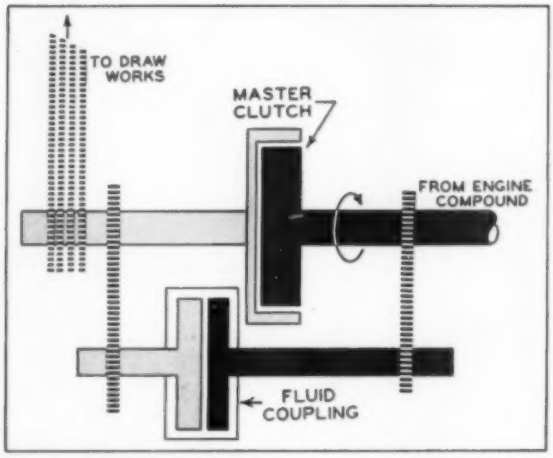
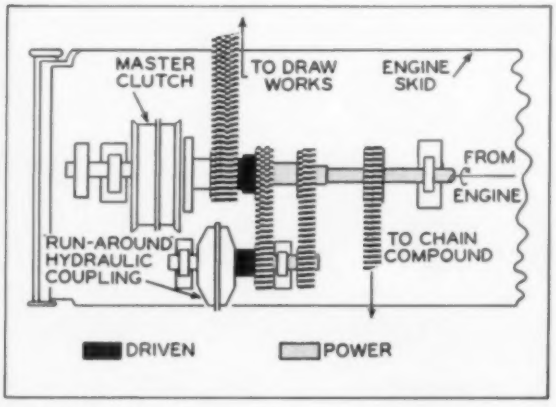
See the RW-300 in operation at the ACS exhibition, April 13-17, San Francisco.

THE THOMPSON-RAMO-WOOLDRIDGE PRODUCTS COMPANY

RUNAROUND auxiliary draw-works drive is used on this Superior Oil Co. rig being operated in Castaic area of California.



OPERATION PRINCIPLE of runaround. Amount of oil in the coupling can be controlled, thus controlling power transmitted. Fig. 1.



INSTALLATION of runaround auxiliary draw-works drive uses 24-in. coupling, so that only 2 ft. need be added to the engine skid to make room for the drive. Fig. 2.

Drilling crews call it the runaround—the manufacturer has a different name for it—but by its use, a . . .

Power rig has steam-drive feel

Here's a new way to give a soft drive to the rotary on a power rig. It's a fluid coupling which bypasses the master clutch. Amount of oil in the coupling can be controlled so that power output can be controlled to a fine point. Thus, the drive limits torque on the rotary and pull on the sand line. It is simple, rugged, foolproof, and operates with finger-tip control. It would be a worthwhile addition to power rigs of all sizes.

BY ED McGHEE
District Editor

SEVERAL RIGS now working have a new drive arrangement between their engines and draw works. They use a fluid coupling in parallel with the master clutch in the draw-works drive. Power can flow selectively either through the master clutch or through the fluid coupling.

Because the fluid coupling in effect bypasses, or runs around the master clutch, rig crews have dubbed it the "runaround." The manufacturer calls it a "scoop-controlled hydraulic coupling auxiliary draw-works drive."

READY FOR MOVING, draw-works drive is on the engine skid. Two chains on left are to and from coupling; sprocket on right is for draw-works drive. Fig. 3.

LOCATION SITE for drive is here. And extra 24-in. has been left between chain compound case on right and drive-chain housing in center. Master clutch is on left. Fig. 4.

Because amount of oil in the fluid coupling can be controlled, its torque output can be held at any value from zero to its full capacity. And, of course, the fluid coupling is a "soft" drive. Here are the advantages of this "runaround":

1. Torque on the drill string can be controlled to prevent twistoffs or damage to tool joints.
2. Pull on the sand line can be limited to prevent pulling it in two.
3. Starting the rotary and sand reel is smooth, not jerky.
4. Speed of both rotary and sand reel can be controlled easily.
5. Seating or unseating of downhole tools, milling, fishing, and sidetracking are easier and safer.
6. The rotary takes only as much power as needed; all remaining power of the No. 1 engine can without danger be put on the pumps.
7. The driller can start hoisting quickly in case the pipe starts to stick or there is other trouble.

One-to-one drive . . . Fig. 1 shows the principle of the runaround. Just as air pressure can be put on or bled off the clutch to engage and disengage it, so can oil be put in or taken out of the coupling to engage and disengage it. So, if the clutch is engaged and the coupling is disengaged, all power goes through the clutch and the coupling "free-wheels." Or, if the clutch is disengaged and the coupling is engaged, power goes through the coupling alone.

The sprockets on the chains to the runaround neither speed up nor slow down the drive. In other words, the runaround has a 1-to-1 ratio of speed around the clutch. Because this ratio is 1 to 1, both master clutch and fluid coupling can be engaged at the same time. If they are, there is no undue strain on any part. There is no advantage to engaging both clutch and coupling at the same time, but there is no harm done.

Long use in the field has proved the fluid coupling to be a rugged device. This fact and the arrangement shown here make the runaround a dependable, maintenance-free, and foolproof drive.

Needs only 24 in. . . . While Fig. 1 shows the principle of the runaround, Fig. 2 shows how it is installed on the rig. The only difference is that the actual drive of Fig. 2 has both input and output sprockets of the coupling (and the clutch) on the same side.

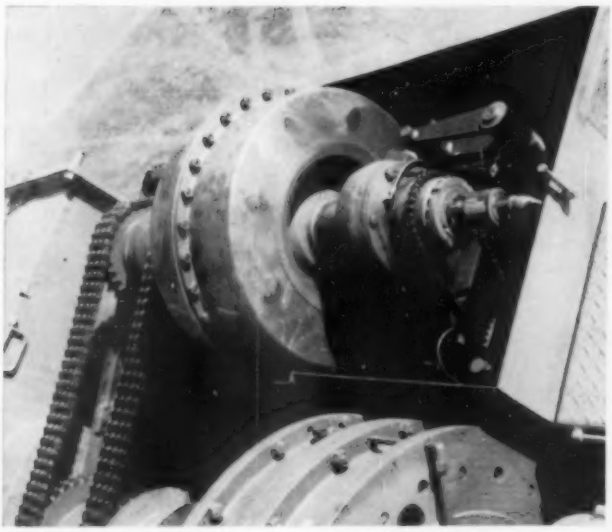
Fig. 3 shows an engine skid with the runaround installed. The master clutch is in the foreground and the runaround is just behind it. The empty sprocket to the left of the clutch is the draw-works drive. Fig. 4 shows a rig on which a runaround is to be installed. To make room for the drive, an extra 24 in. has been left on the engine skid between the engine compound on the right and the draw-works drive in the center.

Air controls scoop . . . Fig. 5 is a closeup of the fluid coupling in the runaround. Oil for operating the coupling is pumped from a sump in the bottom of the coupling case. The chain in the foreground of Fig. 5 drives the pump which moves oil into the coupling. On the right of the picture is the control linkage for operating a "scoop" inside the coupling. This scoop actually is the return pipe by which oil flows out of the coupling and back into the sump.

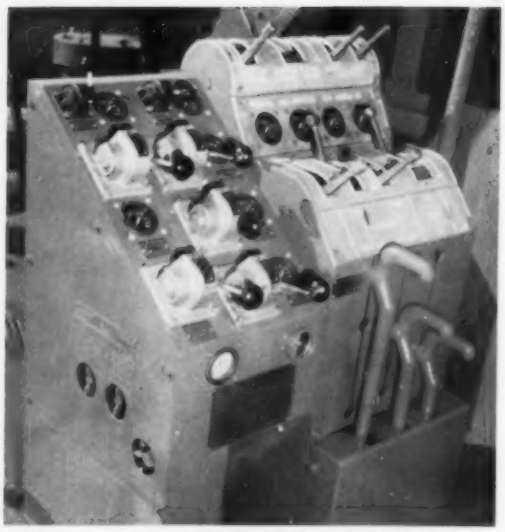
However, the scoop can be moved so that more or less oil stays in the coupling. The more oil there is, the more torque can be transmitted; the less oil, the less torque. If the scoop takes out all oil, torque output is zero. If the scoop allows the maximum of oil in the coupling, the torque output will be the full rating of the coupling. With the 24-in. coupling shown in these figures, that maximum output is about 300 hp. at rated engine speed.

When the engines are idling, centrifugal force sets up a ring of oil around the outside of the coupling. As the scoop advances or retracts, it makes the oil ring thicker or thinner. The thicker the oil ring, the more torque is transmitted; the thinner the ring, the less torque. If the scoop is advanced completely, it takes out almost all oil in the coupling, and torque output is zero. If the scoop is fully retracted, the oil ring in the coupling has its maximum thickness and torque output will be the full rating of the couplings.

The hydraulic coupling "slips"



RUNAROUND COUPLING with case cover removed. Linkage on right controls a scoop that regulates amount of oil in the coupling, dictating the amount of power transmitted. Fig. 5.



RUNAROUND CONTROL on the driller's panel. Middle lever at left on panel moves the scoop linkage on the coupling, which controls the power used. Fig. 6.

about one-twenty-eighth of the ratio of input to full output speed. Thus, when the master clutch is engaged it will "pick up" from the coupling and the coupling becomes "locked" and transmits no power.

Fig. 6 shows the driller's console of a rig fitted with a runaround. The middle handle on the left of this console controls the air for operating the "scoop" in the coupling. As this handle is raised, more air goes to the "scoop" linkage, and more torque is transmitted through the coupling. The air gage just above the control handle shows the driller how much pressure is on the "scoop" controls, giving him a measure of how much torque his rotary drive is taking.

How to use the runaround . . . If a driller has a runaround on his rig and wants to use it to drive his rotary, he first disengages both coupling and master clutch. No power is getting to the draw works. Then, he engaged the rotary drive in the draw works and begins to feed air little by little into the coupling. As the driller adds torque, the rotary will begin turning very slowly and smoothly. He can continue to move his control valve until the rotary eases up to operating speed. The same applies to the sand-reel drive.

With the rotary in operation, all remaining power can safely be put to driving the pumps. But, even if something goes wrong, there is no danger of the full power of the engine compound being thrown onto the rotary drive as it might be with a straight mechanical drive. The runaround transmits only the amount of torque it is set for and no more. Thus, even light drill tubing is protected from being twisted in two.

Tool joints are safer when the runaround is used. When torque gets too high, tool joints tend to "screw through themselves." This is especially true in fishtail-bit drilling. But, with the runaround, when torque goes up, the rotary simply stalls out with no damage to any part of the drive or the drill string.

When the driller is ready to make a connection or come out of the hole, he disengages his pump drives and engages the master clutch to the draw works to get full hoisting power.

At any emergency, or if the pipe should begin to stick while the runaround is in use, the driller likely would want to start hoisting it immediately. This he can do very quickly if using the runaround. The driller simply shoves the draw-works-drum drive into low, engages the air controls to the master clutch and one of the drum clutches. Of course, when full power is needed, the driller can declutch his pumps.

Counting mill teeth . . . With the runaround the driller gets a "feel" with the rotary that has been possible heretofore only with steam drive. This easy and ready control of speed and torque, or feel, is most important during fishing, side tracking, milling, or seating and seating downhole tools. At these times, it pays to be able to rotate slowly and without jerks.

The runaround is so smooth that one driller has said that with it he could "count the teeth on the mill" by the action of the drill string as the rotary eased around.

Many sand lines have been jerked in two because of the lack of control on speed and torque with straight mechanical rigs. A rig equipped with the runaround is able to ease into the sand-line load so that it can be started moving very slowly and with less danger of breaking.

At least six in use . . . The runaround, is the brain child of Forrest J. Young, chief engineer of National Supply Co. It is the outgrowth of a long search for a "soft drive" to the rotary without the expense of an independent drive. First runaround was installed on a National 110 rig operated by Superior Oil Co. in California. After more than a year in use, it is still performing satisfactorily.

Runarounds have been put on a rig of Reading & Bates now operating in Canada, a Brown Drilling Co. and Helmerich & Payne rigs working in Venezuela, and on three International Drilling Co. rigs destined to work in various parts of Africa.

"With the runaround the driller gets a 'feel' with the rotary that has been possible heretofore only with steam drive . . . It pays to be able to rotate slowly and without jerks."

BY W. L. NELSON, Technical Editor

How Refinery-Operation Costs Have Risen

THE ENORMOUS number of statistics required in developing the tabulation on this page cannot be explained now but as the Process Costimating series develops, each column of the tabulation will be explained in several issues. As an example, the first column (total fuel) was developed in Process Costimating No. 4 (March 17, 1958, p. 190, supplementary information on the heating value of fuels was published in No. 3 (March 10, 1958, p. 197), and the subject of fuel costs will be explored more completely in issues No. 6 (Fuel Costs Throughout the World), No. 7 (Fuel and Steam for Major Operations), and Nos. 10 and 11.

The total operating costs shown here are substantially the same as those indicated by the Nelson Operating Cost Index (Process Costimating No. 2, March 3, 1958, p. 167) when using $1.27 per barrel as the cost during 1956 (only $1.025 if financial-type changes and research are eliminated—see tabulation).

The sum of these operating costs, the cost of delivered crude oil, and the average profit (see How Much Profit Do Refiners Make? OGJ, Nov. 26, 1956, p. 100) is substantially equal to the value of refinery products. Such a realization was made in Process Costimating No. 1 (February 24, 1958, p. 147) for the year 1957.

The complexity of refining can be gaged somewhat by the cost of refining a barrel of crude oil. If inflation and deflation are corrected for by stating all costs at 1956 dollar values, the cost of refining has been about as follows:

1926-1938 75 ct./bbl. (69- 79)
1939-1942 87 ct./bbl. (82- 91)
1943-1945 98 ct./bbl. (93-101)
1946-1952 102 ct./bbl. (99-105)

Since 1952 the cost has risen at the rate of about 5 cents per year.

Average Cost of Operating Refineries Since 1926

(cents per barrel)

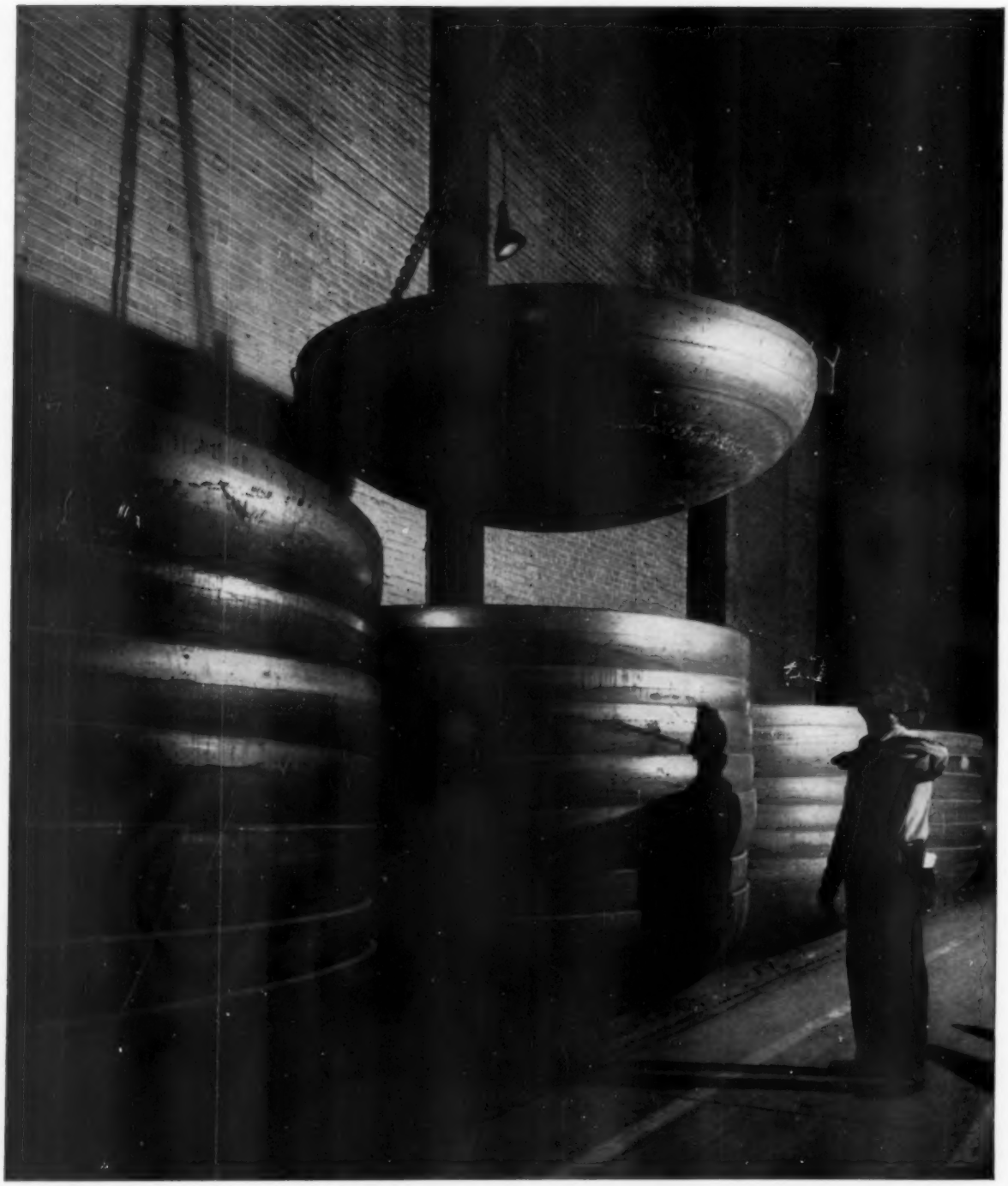
	Total fuel*	Total labor	Purchased power	TEL chemicals, and supplies	Maintenance materials	Subtotal	Insurance and taxes	Royalties or research	Obsolescence‡	Interest on capitalization¶	Total Cents	Total Index
1926	14.1	15.6	0.9	2.1	†4.0	36.7	2.3	†0.26	4.5	6.7	50.4	40.3
1928	8.3	14.8	0.9	1.9	†4.0	29.9	2.2	†0.27	4.7	6.6	43.6	34.9
1930	7.7	14.8	0.9	4.3	3.6	31.3	2.1	†0.20	4.8	6.3	44.7	38.5
1931	6.0	14.6	0.9	3.7	3.5	28.7	2.1	†0.18	4.8	6.2	42.0	33.6
1932	5.6	11.8	1.0	2.8	3.4	24.6	2.0	0.18	4.7	5.0	36.4	29.2
1933	6.0	11.3	0.9	3.2	3.3	24.7	2.0	0.20	4.8	3.0	34.7	27.8
1934	6.8	12.6	0.95	3.9	3.2	27.4	2.0	0.20	4.9	2.9	37.4	30.0
1935	6.1	14.1	0.95	4.0	3.2	28.4	2.0	0.22	5.1	3.0	38.8	31.0
1936	6.1	14.1	0.95	4.3	3.3	28.7	2.1	0.23	4.8	3.0	38.8	31.1
1937	6.1	16.1	0.95	4.6	3.4	31.2	2.1	0.27	4.5	3.1	41.2	33.0
1938	5.4	17.1	0.95	4.8	3.6	31.8	2.1	0.30	4.2	3.7	42.1	33.7
1939	5.2	17.1	0.95	6.1	3.8	33.2	2.2	0.32	3.9	4.3	43.9	35.1
1940	5.4	17.6	0.95	7.2	3.9	35.0	2.3	0.35	3.7	4.4	45.7	36.6
1941	5.9	18.6	0.9	8.1	4.0	37.5	2.4	0.38	3.4	4.7	48.4	38.7
1942	6.8	21.6	1.15	5.9	4.5	39.9	2.5	0.33	3.1	4.9	50.7	40.6
1943	7.7	26.1	1.35	7.3	†4.8	47.2	2.7	0.32	2.8	5.1	58.1	46.5
1944	8.4	28.9	1.5	8.2	†5.5	52.5	2.8	0.30	2.3	5.3	63.2	50.6
1945	8.2	31.2	1.55	8.2	†6.0	55.1	3.0	0.28	2.1	5.6	66.1	53.0
1946	9.0	36.7	1.5	8.1	6.4	61.7	3.2	0.45	2.1	6.0	73.4	58.7
1947	12.4	38.7	1.4	9.5	6.8	68.8	3.4	0.50	2.0	6.5	81.2	65.0
1948	15.8	42.6	1.3	11.7	6.8	78.2	3.7	0.56	1.9	7.0	91.4	73.2
1949	12.7	38.6	1.55	11.5	7.0	71.4	4.0	0.62	1.9	7.5	85.4	68.3
1950	12.9	41.0	1.55	13.0	7.3	75.7	4.3	0.67	1.9	8.1	90.7	72.6
1951	14.3	44.2	1.5	14.7	7.6	82.3	4.6	0.71	1.7	8.7	98.0	78.5
1952	14.1	44.6	1.55	15.8	8.1	84.2	5.0	0.75	1.6	9.3	100.8	80.7
1953	15.6	47.0	1.65	17.9	8.5	90.7	5.3	0.80	1.4	10.0	108.2	86.6
1954	16.3	45.7	1.95	18.8	8.8	91.5	5.8	0.85	1.3	10.7	110.1	88.2
1955	18.1	45.5	1.95	20.2	8.4	94.2	6.1	0.96	1.9	11.4	114.6	91.7
1956	20.0	50.2	2.1	21.9	8.3	102.5	6.6	1.06	2.4	12.3	124.9	100.0
1957 est.	23.8	53.0	2.2	22.4	8.1	109.5	6.9	1.16	2.7	12.9	133.2	106.8

*Includes catalytic coke and gas produced in the refinery. This amounted to nearly 50 per cent of the total refinery fuel during 1957, but only about 40 per cent during 1942 and even less at earlier dates.

†Estimated for purpose of completing entire range of years.

‡As per cent of investment, about 4.0 in 1926; 5.1 in 1935; 1.5 in 1945; only 0.5 in 1953; and 0.85 in 1957. Note that improvements which add primarily to capacity or quality without displacement of existing facilities (as catalytic cracking and most of the recent developments) are not charged to obsolescence. Depreciation in the bookkeeping sense is already cared for by maintenance costs. The cost of improvements in quality is very much larger.

¶1926-1931, 6 per cent; 1932-1939, 3 per cent; 1940-1957, 4 per cent.



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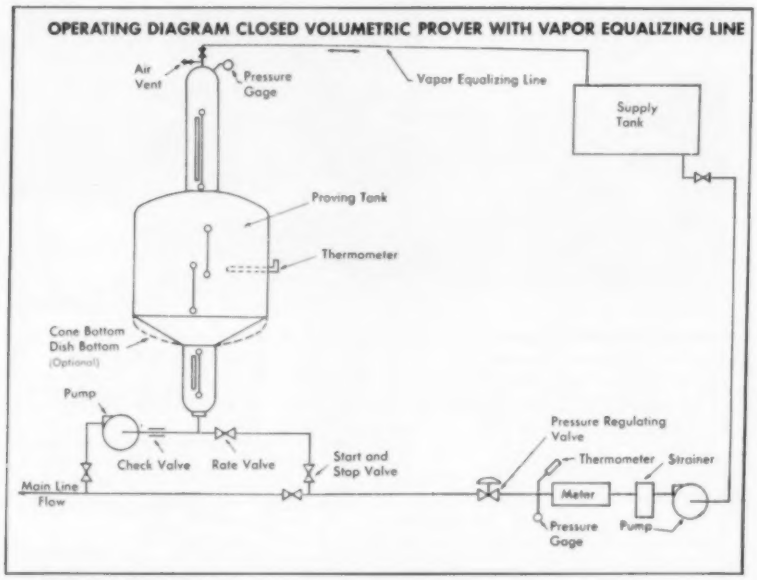
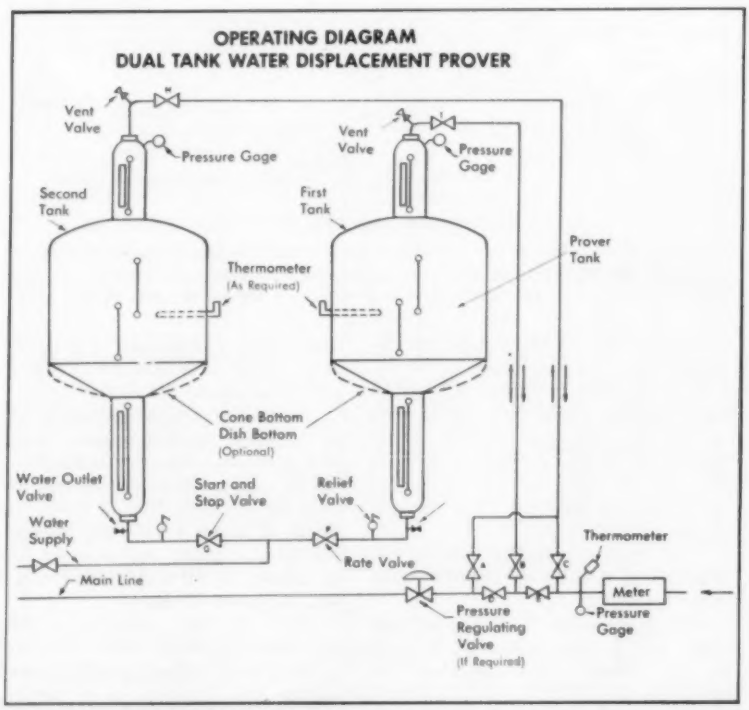


VAPOR-EQUALIZING line of vapor-displacement prover connects vapor space of supply tank with top of prover to establish equilibrium conditions. Fig. 1.



WATER-DISPLACEMENT prover is usually used for LPG. One vessel is filled with water, the other with the test liquid. Water is then run into test-liquid tank, forcing the test liquid out of the system. Fig. 2.

BY M. L. BARRETT, JR.

THE vapor-displacement prover of Fig. 1 is particularly adapted to the proving of meters in LPG, anhydrous ammonia, and other high-vapor-pressure liquid service. The vessel is usually of the conventional shape with top and bottom gage glasses.

A vapor-equalizing line connects the vapor space of the supply tank with the top of the prover, allowing vapor of the test liquid to pass freely between the prover and the supply tank. In operation, the prover is first filled completely with the test liquid and the vapor-equalizing line allowed to fill with vapor.

When the air has been driven out, the equalizing line is opened to the prover to establish equilibrium conditions. As the liquid is pumped from the prover, it is replaced with vapor from the supply tank and alternately, when a meter test run is made, the vapor is displaced back to the supply tank.

In principle, this proving method maintains an equilibrium condition of liquid and vapor. Loss of test liquid during a proof is prevented.

The dual-tank water-displacement method of closed-meter proving is illustrated in Fig. 2. The method is primarily useful for high-vapor-pressure liquids such as LPG and employs water or some other immiscible liquid to isolate the test liquid from the atmosphere.

In operation, the test liquid is piped to the top of each prover and a water bypass connects the two bottom necks. One vessel is filled with water and the other with test liquid and all air or vapor vented from the system.

With the water-test liquid meniscus in the top gage glass of one of the tanks, a proof run is made to that tank pushing the water to the second tank and in turn pushing the test liquid in the second tank out of the system. Flow is continued until the meniscus appears in the bottom gage glass.

Subsequent test runs are made by alternating the test-liquid inlet between the tanks to repeat the water displacement from its tank for each

Author is with Shell Oil Co. Paper presented at ASME petroleum division annual conference, Tulsa.

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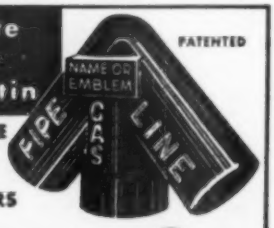

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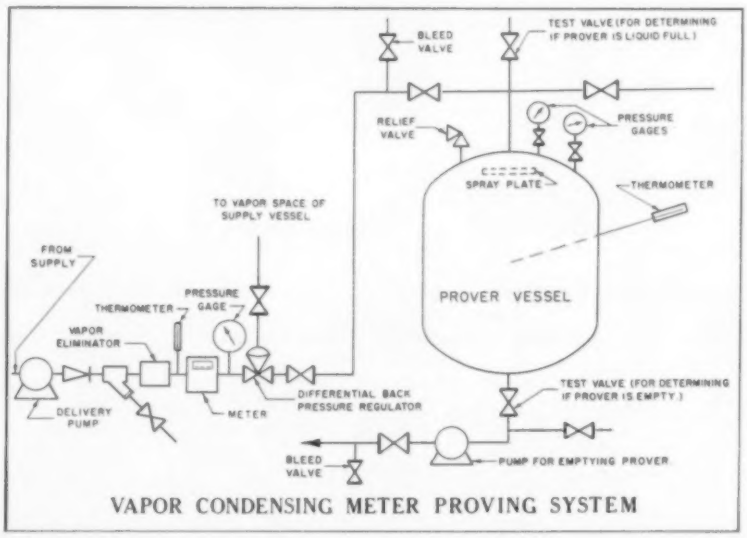
VAPOR-CONDENSING prover was devised by Phillips Petroleum Co. for LPG. Fig. 3.



VAPOR CONDENSING METER PROVING SYSTEM

AMOUNT OF LIQUID delivered to vapor-condensing prover is equal to its water-calibrated volume, less liquid content of vapor in prover at start of run. Fig. 4.

run. This arrangement does not require a prover return pump.

In a single-tank procedure, one of these provers would be replaced with a water-receiving sump and the water pumped back into the prover for each test run. Caution must be exercised in using this method when the test liquid must be kept dry.

The vapor-condensing prover of Fig. 3 was devised by Phillips Petroleum Co. for LPG.

The prover tank itself has no gage glass and is water-calibrated to gage its fixed volume when completely full of liquid (Fig. 4).

Test liquid from the meter is brought to the top of the pressure vessel where it is sprayed into the tank thoroughly. The bottom of the prover is provided with suitable pump and hose to evacuate the liquid.

Bottom and top test valves are used to determine when the prover is completely empty and completely full of liquid, since these conditions must exist before and after a proof run. Prior to proof runs, the prover is filled and emptied one or more times to assure an air-free system and to wet the prover walls.

After the last preliminary filling and emptying, a portion of the vapor in the prover is bled to atmosphere to reduce the pressure to a predetermined level. This has been established at 10 psig. by Phillips, for which pressure they have arranged tables of tem-

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ALSO USED is master meter unit (left, Fig. 5) and bidirectional free-piston-displacement prover (right, Fig. 6).

perature versus liquid content in the vapor space.

In operation, a proof run is then made into the prover at the desired rate of flow until the meter stops. The top test valve is used to determine if the prover is liquid full, for if it is not, the test run must be disregarded.

The amount of liquid actually delivered to the prover is equal to its water-calibrated volume minus the tabulated liquid content of the vapor in the prover at the start of any test run.

In some operations it is expedient and considered sufficiently accurate to prove a meter while in service with a second or "master" meter. Fig. 5 illustrates a semiportable master-meter proving unit capable of deliveries up to 2,200 bbl. per hour.

A meter-proving procedure developed by the Shell Oil Co. especially for high-vapor-pressure liquids such as LPG is the bidirectional free-piston-displacement prover.

The prover involved in this method is shown in Fig. 6. It consists basically of a honed steel cylinder in which a precision-machined piston is caused to reciprocate. The piston is sealed against the cylinder walls by means of a standard O-ring and antifriction rings and is propelled through the cylinder by the metered liquid.

The ends of the cylinder are closed except for a 2-in. pipe extending through the center of each closure to the inside of the cylinder. Externally, these 2-in. pipes communicate to a four-way, four-port, two-position valve.

The remaining two ports of the four-way valve communicate by means of flexible hoses to the meter outlet and the fill connection of the vessel containing the liquid of the test draft. The inlet hose from the meter to the prover is equipped with a suitable sight-flow glass and a strainer.

The outlet hose from the prover is equipped with a sight-flow glass and a differential valve capable of creating a back pressure sufficient to prevent flashing of the liquid.

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Among the Drilling Contractors

HOUSTON CONTRACTOR M. F. Clegg (left) presents AAODC chapter library-book check to Prof. C. V. Kirkpatrick petroleum engineering department head, University of Houston, in a program in which . . .

Drillers aid technical training

HOUSTON'S chapter of the American Association of Oilwell Drilling Contractors is supporting efforts to advance scientific and engineering education in the drilling industry by another financial grant to the University of Houston for the purchase of technical books to be added to the school's engineering library.

This year's grant totals $500. Formal presentation of a check for that amount was made to the university in behalf of the Houston chapter by M. F. Clegg, chapter chairman, and a partner in the contracting firm of Clegg & Hunt. Prof. C. V. Kirkpatrick, head of the department of petroleum engineering, who received the grant for the university, will direct the library additions.

This is the second consecutive year that Houston contractors have made a grant to the University of Houston.

Who's getting the drilling contracts?

Ace Drilling Co., Dallas, has contract for a new wildcat in Rapides Parish, Central Louisiana. The well is W. P. Ballard, Jr., Cordell & Cordell 1 Lee Lumber Co., 21-5n-3e. Location of this 5,200-ft. Wilcox test is 2 miles west of North Big Island field.

Robb Drilling Co. has contract for a field well at Tow Creek in western Colorado's Routt County. The well is Cabeen Exploration Co. 5 Bradley, NW NE NW 18-6n-86w.

Nye & Snell Drilling Co. have contract for El Paso Natural Gas Co. 2 Unit at Desert Springs in Sweetwater County, Green River basin, Wyoming. The well is in SE NW SE 22-21n-98w. Plans call for a Mesaverde test to follow up the recent Desert Springs gas discovery, one of the Green River basin's exploratory highlights of recent months.

Rimrock-Tidelands, Inc., has contract for a Sinclair Oil & Gas Co. Gulf of Mexico wildcat. The 5 OCS-0605, Block 86, South Timbalier area well, is 3,266 ft. from the north line and 4,416 ft. from the west line of Block 86 with bottom-hole objective set for 4,966.69 ft. from north line and 4,416.71 ft. from west line.

Graham-Michaelis Drilling Co. is handling contract for Helmerich &

SMILES OF SATISFACTION adorn faces of Falcon Seaboard officials and others as they watch the embarking of the company's first self-contained drilling barge for its first assignment in Louisiana's coastal water beds.

The recently commissioned barge now is drilling near 15,000 ft. on its first operation, a Gulf Oil Corp. wildcat test on the National Audubon Society preserve southwest of Intercoastal City, in southern Vermilion Parish.

Location is adjacent Fearman Lake, off the extreme western arm of Vermilion Bay, and about 8 miles inshore from the Gulf of Mexico shoreline.

Shown in the pictures, taken at the commissioning ceremonies at the Beaumont yards of Levingston Shipbuilding Co., where the barge was built and assembled, are: Ted N. Law and J. L. Strauss, president and executive vice president, respectively, of the Falcon Seaboard Drilling Co., Tulsa; Ed Malloy, Levingston board chairman; E. D. Arnold, Falcon Seaboard drilling engineer, Houston; Charles W. Alcorn, vice president, and W. H. King, also of Houston; Herb Beardmore, Houston district manager, Gulf Oil Corp.; and W. A. Grapes, Falcon Seaboard district manager, Lafayette, La.

Although this is Falcon Seaboard's first self-contained drilling barge, the company has operated in Louisiana's marshes and water beds for many years. Previous operations have been with its rigs on rented or operating-company barges, or on platforms. The new assembly, namd for the company's president, is dsigned only for work in protected water areas.

Payne, Inc. 1 Eubank, new oil discovery well in western Haskell County, western Kansas. The discovery well in NW NW NW 28-28s-34w. It has production in the Morrow and Mississippian, and lies inside Hugoton gas field. Location is 8 miles south of Pleasant Prairie pool and 13 miles northwest of Sublette, Kansas.

Gilmour Drilling Co., Alice, Tex., has a new contract operation in western Jim Wells County, South Texas. It is a 5,750-ft. test for Miller & Fox at 1 Guadalupe de Garcia. Location is about ½ mile east of the Duval County line, and about 7 miles northeast of San Diego, in the latter county.

Circle Drilling Co., Lake Charles, La., is under contract for a 11,300-ft. test to be drilled for Reese Carter, of New Orleans, in the College Point-St. James area, about 30 miles up the Mississippi River from New Orleans, in St. James Parish, Louisiana. The test will be drilled as 1 Karstein with location in 41-13s-16e.

Peal Brothers Drilling Co., Hoisington, Kans., has a rig running on a new wildcat operation in Ness County, western Kansas. It is a contract job for R. W. Shields at 1 Pabst, in 24-18-21. Location is about 6 miles northwest of Bazine, and 2 miles northeast of Ryersee field, nearest production. It is a Mississippian test with contract to 4,650 ft.

Jack Reed Drilling Co., Scottsville, Ky., has moved a combination rotary and cable-tool rig to Lauderdale County, northwestern Alabama, where it now is on the first of a series of Knox dolomite tests it has contracted to drill for Candiff Oil Co., of Owensboro, Ky. Location of the present test, 1 Hollis, in 9-1s-10w, is northeast of Hines and a little more than 1 mile from Tennessee line. Contract on this test is for 2,000 ft. The drilling program involves leases extending into northeastern Mississippi and southern Tennessee.

WILDCAT DRILLERS—Day-tour crew on a deep-drilling rig Layton & Newton Drilling Co., Fort Worth, is running under contract for Richardson & Bass far-southwestern Texas' sparsely explored Terrell County. Shown with T. R. (Whitey) Fowler (extreme left), tool pusher, are: R. C. Holcomb, J. D. Lunsford, Johnny Hays, Caly C. Richardson (driller), and L. E. Collins. The test, 1 Goode, in the southwest part of the county, is one of two deep wildcat tests in the county that are drilling with air.

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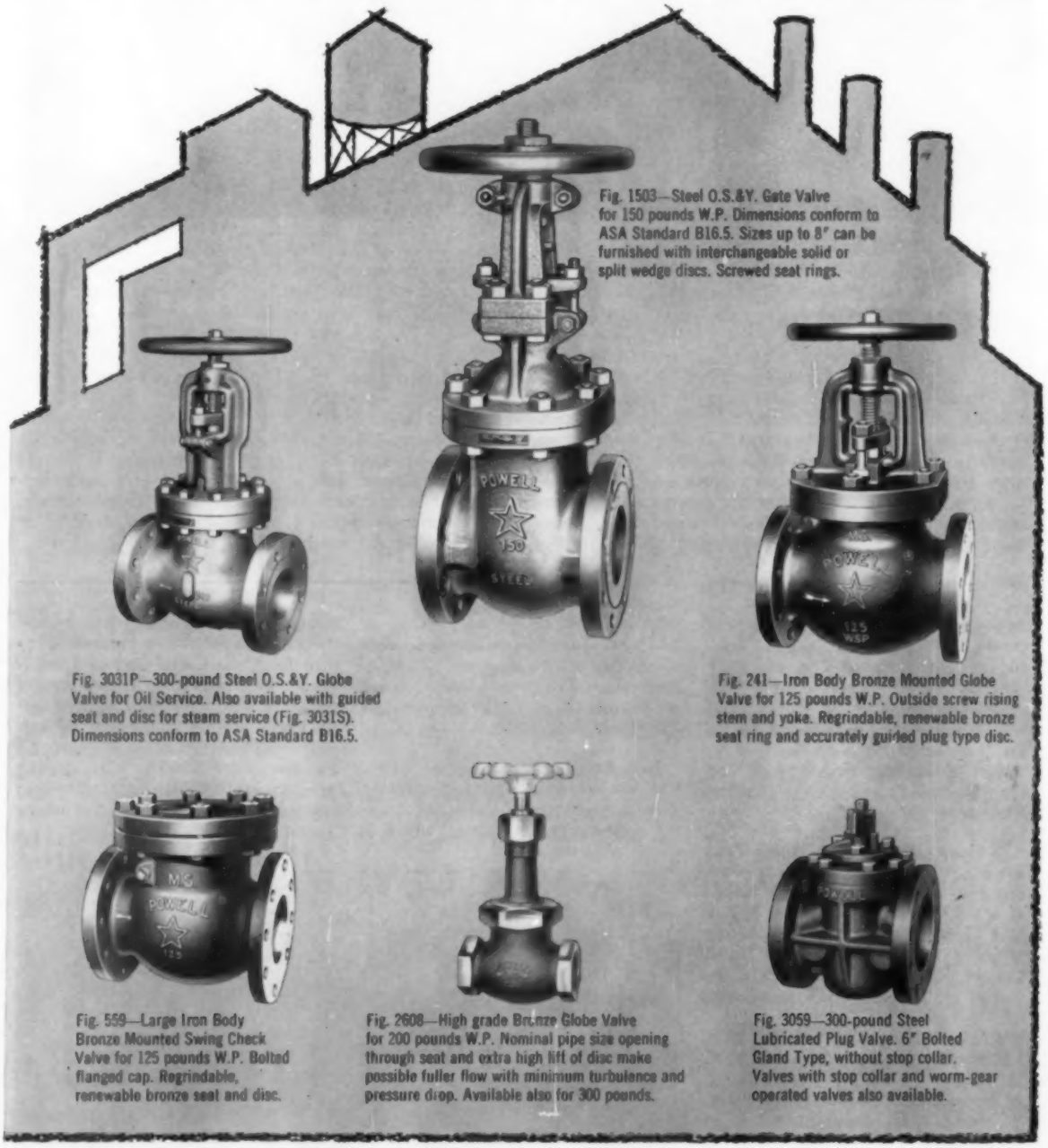

Fig. 1503—Steel O.S.&Y. Gate Valve for 150 pounds W.P. Dimensions conform to ASA Standard B16.5. Sizes up to 8" can be furnished with interchangeable solid or split wedge discs. Screwed seat rings.

Fig. 3031P—300-pound Steel O.S.&Y. Globe Valve for Oil Service. Also available with guided seat and disc for steam service (Fig. 3031S). Dimensions conform to ASA Standard B16.5.

Fig. 241—Iron Body Bronze Mounted Globe Valve for 125 pounds W.P. Outside screw rising stem and yoke. Regrindable, renewable bronze seat ring and accurately guided plug type disc.

Fig. 559—Large Iron Body Bronze Mounted Swing Check Valve for 125 pounds W.P. Bolted flanged cap. Regrindable, renewable bronze seat and disc.

Fig. 2608—High grade Bronze Globe Valve for 200 pounds W.P. Nominal pipe size opening through seat and extra high lift of disc make possible fuller flow with minimum turbulence and pressure drop. Available also for 300 pounds.

Fig. 3059—300-pound Steel Lubricated Plug Valve. 6" Bolted Gland Type, without stop collar. Valves with stop collar and worm-gear operated valves also available.

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NEW EQUIPMENT

Insulation For Vessels Withstands 1,850° F.

The new asbestos-base block insulation is called Abosite. It's durable, lightweight, and has low shrinkage, the maker reports. It is made of long-fiber South African asbestos bonded with an inorganic silicate binder. It's available in two types to withstand temperatures to 1,000° and 1,850° F., respectively. These types are labeled Standard and Super. The insulation comes in thicknesses of 1 through 4-in., in 36-in. lengths, and in widths ranging from 6 to 48 in.

Abosite has no shrinkage up to 800° and only negligible shrinkage at higher temperatures, the maker reports. It will not pulp or wash off when exposed to moisture. It's not brittle, has cushioning action, and will not powder or shatter under vibration or impact. Not materially affected by steam, acid, or fumes, the insulation is applied by standard methods and is reportedly easy to fit. **Write or call: Aber Co., Inc., 4832 Almeda Street, Houston, for details on Abosite.**

●

Mud-Suction Valve Employs Toggle Action

The toggle action locks the valve into a closed or open position when the toggle is brought past center. The valve is spring loaded in both positions. Thus it keeps constant tension on the seal. Valve-handle position indicates if the valve is open or closed.

The valve has been tested to 2,000 lb.

A 2-in. union in the pipe housing makes it easy to break the assembly down for shipment. Available valve sizes are 6, 8, 10, 12, and 16 in. **Write or call: Medearis Oil Well Supply Corp., P. O. Box 449, Torrance, Calif., for details on mud-suction valve.**

Tractor comes in crawler, wheel types

For use with the new Series 440 tractors, several new items of matched working equipment are available. On the crawler type, room is provided between the grills and engine for front-mounted, crankshaft-driven pumps. The streamlined hood is made of heavy steel plate. The side frames are made of heavy-welded steel. The crawler mounts on two steel cross-members.

An optional feature for the wheel type of tractor is built-in power steering. The gear type of direction reverser is optional on both tractors. This device permits the operator with a touch of the lever to go forward or back up in the same speed without shifting gears. This can be a time-saving feature when loading or bulldozing. A 30 hp., valve-in-head engine powers the tractors. **Write or call: Deere & Co., Moline, Ill., for details on Series 440 tractors.**

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Described in OIL AND GAS JOURNAL - Issue of March 24, 1958

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How Suntide Refining blends products in tanks holding up to 200,000 barrels

Some of the largest tanks ever mixed can be found at Suntide Refining Company's plant in Corpus Christi, Texas. Suntide performs a variety of blending operations in these tanks—equipped in some cases with *five* LIGHTNIN Mixers.

Many of these LIGHTNINs have been in service for four years, blending a wide variety of products: diesel oil, crude, jet fuel, and leaded gasoline. Suntide reports that the mixers have operated continually during that time *without a single failure* of any part including the mechanical seals.

Low-cost maintenance

A mechanical seal, optional equipment on any new LIGHTNIN Side Entering Mixer, is one feature of the mixers installed at Suntide Refining. It can save refiners thousands of dollars per year on big tank mixer maintenance.

The LIGHTNIN Mechanical Seal Mixer eliminates stuffing box repacking, and *never* needs shaft seal adjustment. And the seal can be replaced in a few minutes —even under a full head of liquid in the tank—without dismantling or removing the mixer from the tank!

Exact mixing results

Not all tanks require five large side entering mixers, of course. In many cases, only one LIGHTNIN will blend products to full uniformity in a matter of minutes.

Your LIGHTNIN representative can tell you exactly what mixing action is required to do the job at your refinery. His recommendations are based on data accumulated over many years of Mixco research.

Get just-right mixing in all of your tanks—big or small—by installing LIGHTNIN Mixers. For more information, contact your nearest LIGHTNIN Mixer representative (he's listed in Composite Catalog). Or write us direct.

"These mixers have been running since October 1953, without a single failure of any part including the mechanical seals," says transfer foreman Ray B. Dunn. He's referring to the LIGHTNIN Mixers installed at Suntide Refining Company's Corpus Christi plant.

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MIXCO fluid mixing specialists

FOR LATEST MIXING INFORMATION and full description of LIGHTNIN Mixers, send for these helpful bulletins:

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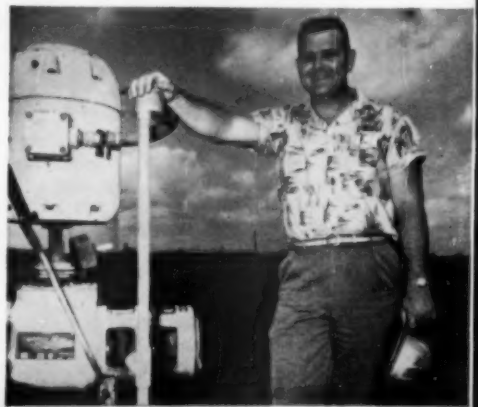
- ☐ Portable: ⅛ to 3 HP (B-108)
- ☐ Laboratory and small-batch production types (B-112)
- ☐ LIGHTNIN Rotary Mechanical Seals for extra low cost mixing
- ☐ LIGHTNIN Mixers for controlling B.S.V.W. (B-503)
- ☐ Condensed catalog showing all types (B-109)
- ☐ Data sheet for figuring mixer requirements (B-107)

Check, clip, and mail with your name, title, company address to:

MIXING EQUIPMENT Co., Inc., 174-c Mt. Read Blvd., Rochester 11, N.Y.

In Canada: Greey Mixing Equipment, Ltd., 100 Miranda Ave., Toronto 10, Ont.



Teeth give tong die strong grip

The new tong die uses an unusual tooth arrangement to provide long wear and prevent slippage, according to the maker. The long teeth have a large gripping surface to assure a strong, positive hold—even on hard-banded joints.

Deep grooves and oblique crosscuts make the die self-cleaning to resist mud and ice. The manufacturer reports extensive field tests show the die is highly durable. **Write or call: Kangaroo Tong Dies, Inc., 502 North Sam Houston, Odessa, Tex., for details on tong dies.**

●

Plastic Pipe Employs Steel Jacket for High Strength

The new pipe combines the strength of steel with the chemical resistance of plastic. Called Jal-Jacket, it consists of a rigid polyvinyl-chloride (PVC) tube jacketed with an electric-resistance-welded steel pipe. In the

oil field, it can be used to carry highly corrosive salt water for water injection in secondary-recovery systems. It can also be used where sour crudes cause short service life for unprotected pipe. The maker reports field tests indicate the smooth inside surface of the pipe materially reduces paraffin buildup and scale deposits.

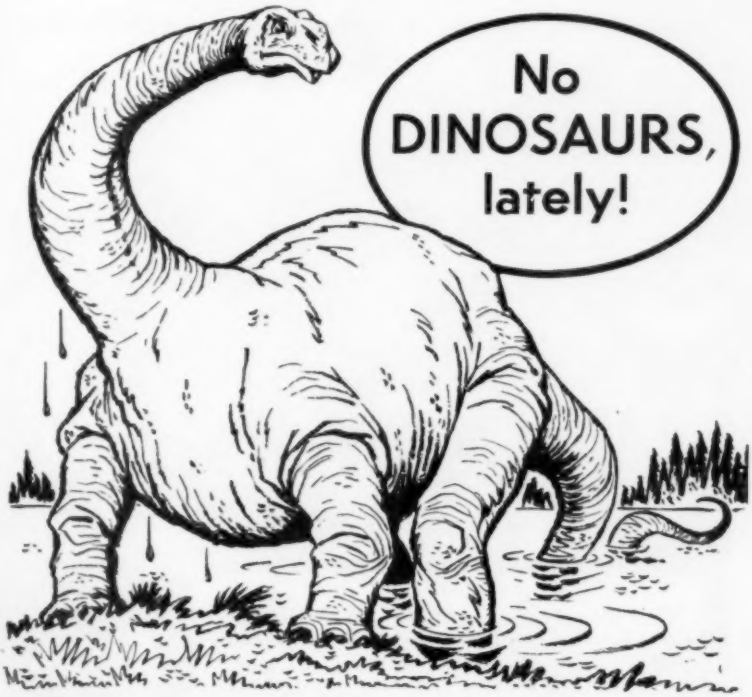
By using a steel jacket, a working pressure of 1,000 psi. at 150° F. is attained, the maker says. The pipe is so designed that the pipe ends and the inside surfaces are continuously protected. A positive seal and fast makeup are provided by the use of Victaulic couplings which lock into mill-rolled grooves.

The pipe comes in 20-ft. mill lengths in 2, 3, and 4-in. nominal o.d. sizes. **Write or call: Jones & Laughlin Steel Corp., 3 Gateway Center, Pittsburgh 30, for details on Jal-Jacket pipe.**

Plastic Material Cuts Lost Circulation

Tradenamed Pheno-Seal, the material is strong enough to withstand the high temperatures and pressures in today's deepest wells, according to the maker. It is chemically inert. Thus it doesn't react with high pH muds. And it is unaffected by heat, acids, alkalies, and bacteria. It has a high tensile strength of 25,000 psi. and a low water-absorption rate of 0.3 to 0.8% in 24 hours. Specific gravity ranges from 1.3 to 1.5.

The maker reports tests show the material: (1) can be pumped with



The extensive magnesium silicate deposits laid down about the time dinosaurs roamed Florida's marshy peninsula became the source of today's most wisely used adsorbent.

Because it contains numerous small fibrous tentacles, Florida Fullers Earth, in its commercial form known as Florex, is particularly valuable in the adsorptive refining, decolorization, clarification and neutralization of mineral, vegetable, and animal oils, fats and waxes. Florex is unequalled in high quality or low cost for processes involving the use of highy active clay for sweetening light distillates, dehydration, desulfurization, and polymerization.

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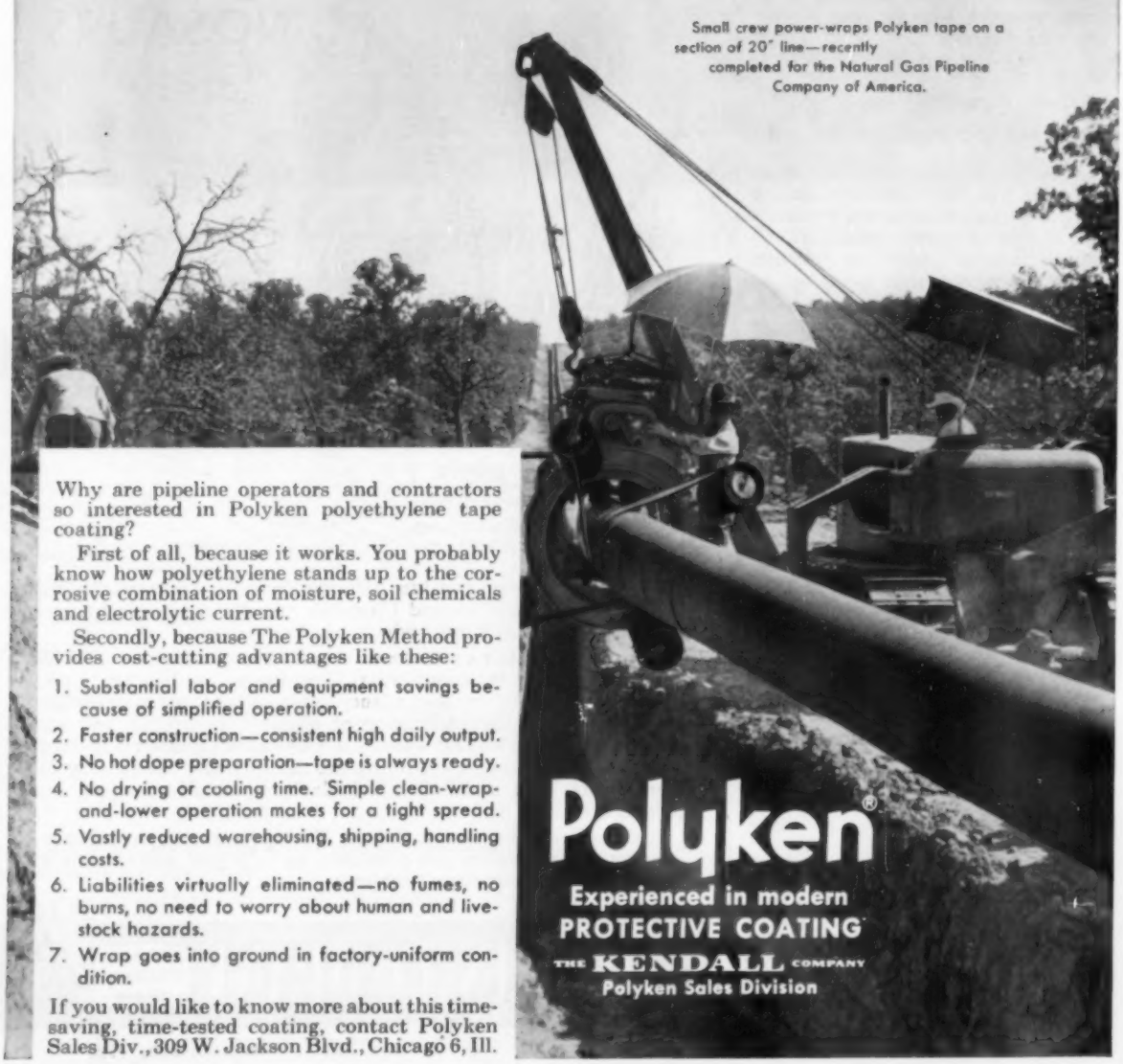

Small crew power-wraps Polyken tape on a section of 20" line—recently completed for the Natural Gas Pipeline Company of America.

Why are pipeline operators and contractors so interested in Polyken polyethylene tape coating?

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Secondly, because The Polyken Method provides cost-cutting advantages like these:

1. Substantial labor and equipment savings because of simplified operation.
2. Faster construction—consistent high daily output.
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5. Vastly reduced warehousing, shipping, handling costs.
6. Liabilities virtually eliminated—no fumes, no burns, no need to worry about human and livestock hazards.
7. Wrap goes into ground in factory-uniform condition.

If you would like to know more about this time-saving, time-tested coating, contact Polyken Sales Div., 309 W. Jackson Blvd., Chicago 6, Ill.

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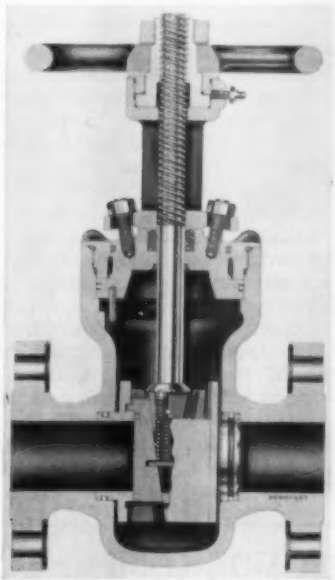
present equipment with little wear on pumps and valves, (2) will not ball up in the mud, and (3) is safe to handle.

The material consists of laminated, phenolic (thermosetting plastic) impregnated layers of high-grade kraft paper and linen. It is ground and graded to give a high sealing ability with a minimum amount of material. It offers an opportunity to save on freight and handling costs as smaller quantities are needed than with present materials, the maker points out. Tests show that only 4 lb. of the material is needed per barrel to seal a 0.14-in. slot. **Write or call: Montello, Inc., 1547 South Knoxville, Tulsa, for details on Pheno-Seal.**

●

New Valve Designed To Stop Seat Wear

A steel nonlubricated type, the new Keroseal valve is designed to handle gases, petroleum products, petrochemical fluids, and others. The maker reports a new principle of operation employing a wedge type of spreader is used which eliminates galling or



wear at the seating surfaces and prevents product contamination through a vapor-tight seal. The valve also employs time and labor-saving design which permits servicing without removing the valve from the line.

Provision is made for installation of a bleed valve to check seal efficiency. Driven either by handwheel, gear, or motor, the valve is operated by raising or lowering its threaded stem.

The valve is available in carbon steel with flanged ends in sizes of 2

Canada uncorks its gas resources

For Canada's vast, almost untouched supply of natural gas, outlets have already been planned to deliver over 10 trillion cubic feet to North American markets. Canadian gas reserves are expected by 1970 to approach 55 trillion cubic feet.

To bring this fuel to millions of future consumers, the great Trans-Canada gas line is designed to span the 2250 miles from Alberta to Ontario. Westcoast Transmission lines will carry British Columbian gas to the U. S. Pacific Northwest. A network of complementary lines will blanket Western Canada's fields. All this at a cost close to $600 millions by 1959.

The Canadian Bank of Commerce maintains a complete Petroleum and Natural Gas Department in Calgary, and more than 270 branches throughout Western Canada. For information on any aspect of the industry in Canada, write or telegraph to C. H. Munro, Manager, Petroleum and Natural Gas Department, 309 Eighth Avenue, West, Calgary, Alberta.

(*We regret that we cannot advise on the merits of oil or mining securities.*)

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through 6 in. made to Series 150 and 300 ASA standards. Standard valves have Hycar O-rings. But Teflon O-rings are available. **Write or call: Kerotest Mfg. Co., 2525 Liberty Avenue, Pittsburgh 22, for details on Keroseal valves.**

●

Loading Assembly Features Sliding Sleeve

The loading assembly—called Spring-Matic No. 450-AM—offers the advantages of high flow rate, compactness, spring balancing, ease of operation, flexibility, long life, and low evaporation, the maker says. It's available in 3 and 4-in. sizes.

The sliding-sleeve assembly permits rapid adjustment of the loader's length. A swing joint at the end of the sliding sleeve allows the dip pipe to hang in a vertical position, regardless of the leading angle. A lever permits control of the loading valve at the end of the stationary section of the assembly.

The loading valve is of dual-poppet and cam construction. It assures shockless closing. An adjustment screw allows regulation of closing time when the valve operates under varying pressures and assorted viscosities. Each spring is housed in a cylinder to prevent rust, entry of foreign matter, or damage. Fittings on the joint allow easy lubrication. And grounding brushes eliminate static. **Write or call: Oil Equipment Mfg. Co., 3100 Vermont Avenue, Louisville, Ky., for details on loading assembly.**

Twin-engined plane is air conditioned

The new Aero Commander is called the Alti-Cruiser. Completely instrumented, it's available in either a six or a four-place version. Complete lavatory facilities are standard in the four-place model.

The instrument arrangement has three separate panel groups. One has the flight instruments electrically driven for pilot use. A similar set is vacuum driven in the co-pilot's side.

The cabin-pressurizing system provides sea-level cabin pressure at heights to almost 5,000 ft. The seats are contoured.

Range of the plane with a 30-minute fuel reserve at 10,000 ft. and 55% of rated power is 1,500 miles. Service ceiling with the two engines is 25,567 ft. With a feathered prop, the single-engine ceiling is 15,000 ft.

High speed at rated power and 10,000 ft. altitude is 260 m.p.h. At 70 per cent of rated power, the cruising speed at 10,000 ft. is 230 m.p.h. Gross weight is 7,000 lb. and total usable fuel capacity is 223 gal. **Write or call: Aero Design & Engineering Co., Box 118, Bethany, Okla., for details on Alti-Cruiser.**

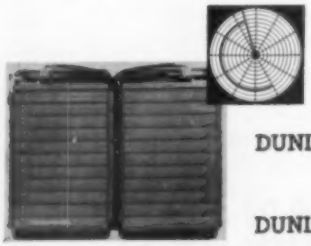
●

Fire Hose Is Strong and Durable

Basic construction of the Fire Box hose consists of a combination of high-tensile-strength fibers woven to provide a uniform balance of all elements of the fiber structure and to obtain high resistance to pressure, wear, weather, and rough handling. Continuous lengths to 100 ft. are available.

Size for size, the hose's pressure-resistance is said to be equal or superior to that of heavier and stiffer conventional cotton jackets despite its lighter weight. The fabric is virtually snagproof, and it is mildew-resistant.

The lining is a reinforced-rubber material bonded firmly to the surrounding jacket. Its smooth waterway insures fast flow. **Write or call: Goodall Rubber Co., 3550 West Twelfth Street, Houston, for details on Fire Flex fire hose.**



Turn Your **COOLING UNITS** *into* **PRECISION EQUIPMENT**

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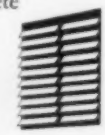
DUNLAP THERMOTROL Units *for radiators*

DUNLAP THERMOMOTOR Controls *for selective automation*

Limit the temperature variation of your cooling units to plus or minus 1° with shutters and controls built and designed by Dunlap — the name that stands for the strongest, most versatile and easily installed auxiliary cooling equipment made today. For the complete story, write or call . . .



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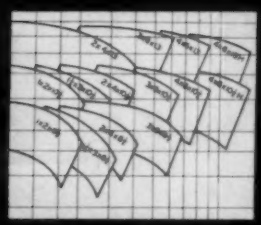
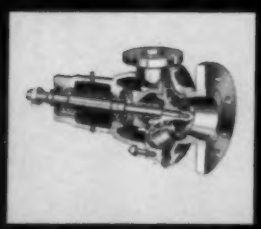
NOW— WE CAN BE SURE!

ENGINEERS *are saying this about Peerless Process Pumps—*



PEERLESS PROCESS PUMPS offer *pinpoint* selection. Thousands of combinations from the complete Peerless line assure you of characteristics that *fit exactly* your system's every requirement.

PEERLESS PROCESS PUMPS meet *today's* pumping needs, and *tomorrow's* as well. Peerless process pumps are built to *expand* with your future system and *still offer a custom* performance pump at an *off-the-shelf* price!

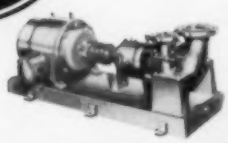


PEERLESS PROCESS PUMPS provide *field-proved performance*, verified by thousands of case histories of pumps in all duties. With Peerless, you get a pump that *you know* will do *exactly* what you buy it for.

RESEARCH AT PEERLESS is exemplified by this bulletin, "MECHANICAL CONSIDERATIONS IN PUMP DESIGN," dealing with the effects of radial loads on process pumps. Request Bulletin No. EM-79.

BUY AND APPLY

PEERLESS PUMPS



Putting Ideas to Work

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FOOD MACHINERY AND CHEMICAL CORPORATION

Peerless Pump Division

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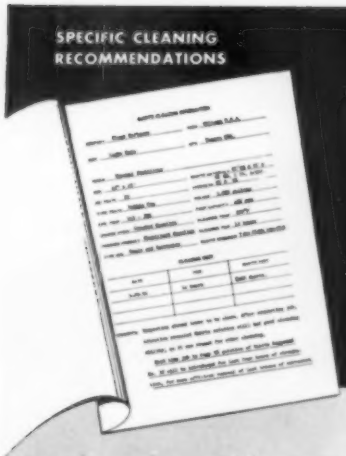
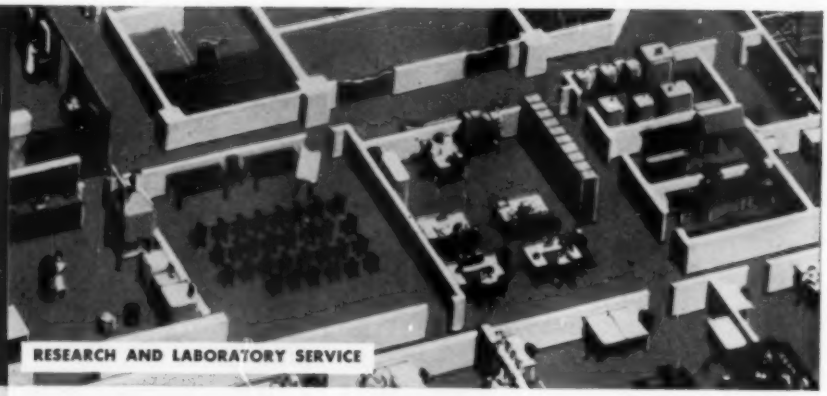
SPECIFIC CLEANING RECOMMENDATIONS



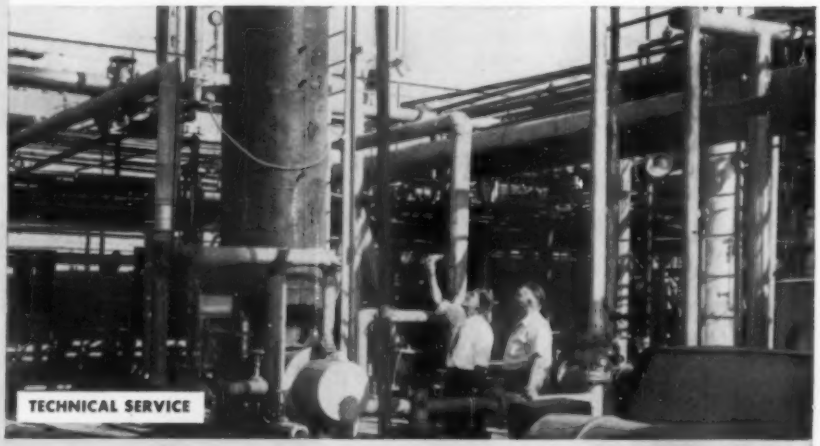


RESEARCH AND LABORATORY SERVICE

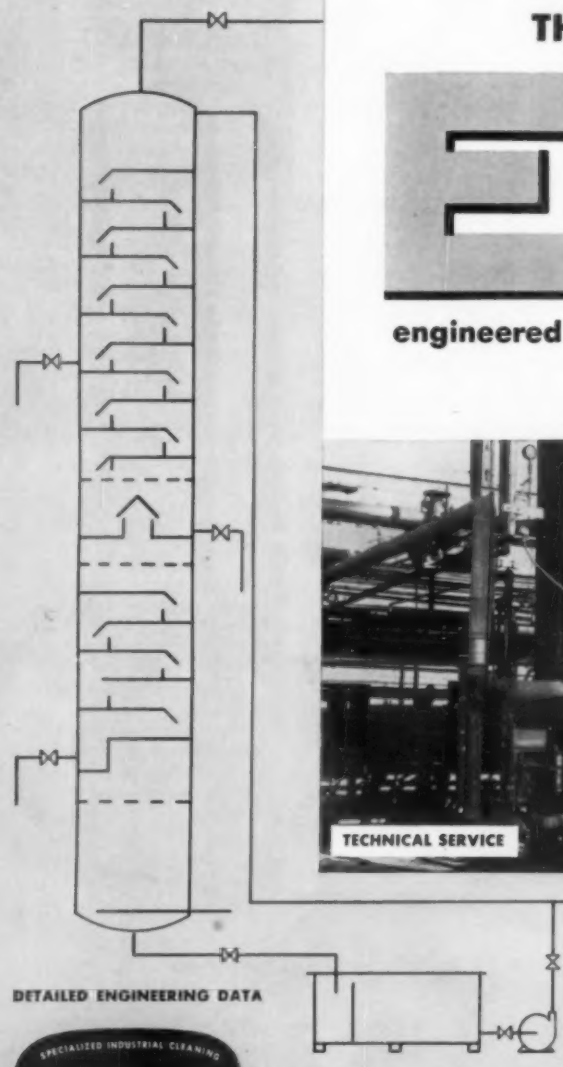
THIS IS THE OAKITE

ECP

engineered cleaning program



TECHNICAL SERVICE



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SCIENCE

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Engineered Cleaning Program

. . . applies the chemistry of cleaning to refinery maintenance

An Oakite ECP offers the *specialized chemical* approach to maintenance cleaning.

Comprehensive, it takes in cleaning of towers, condensers, salvage parts. It even gets down to day-to-day housekeeping jobs. Its goal: To speed turnaround, cut downtime, restore operating efficiency of equipment, maintain maximum plant safety.

HOW IT WORKS—Starting with a study of your equipment and the special soils to be removed, the Oakite engineer sets up for your cleaning crew a schedule of cleaning operations to your time-table. The program blueprints time-saving in-place cleaning and mechanization where feasible. Specific materials are slated for each job—quantities specified. You get schematic drawings, and full engineering details on pumping needs, heating, solution make-up.

The Oakite engineer sticks with a "job" 'til it is clean. He brings into the refinery his long, practical experience. Behind him stands a chemical staff that not only does continuing research on specific cleaners for petroleum soils . . . but also provides laboratory service on problems sent in by field men.

Here, in one "package", one organization, and one responsibility is cleaning put on an engineering level. Avail yourself of its benefits. Call in your local Oakite engineer. Or send for details. Oakite Products, Inc., 50B Rector Street, New York 6, N.Y.

ECP — Your economy key

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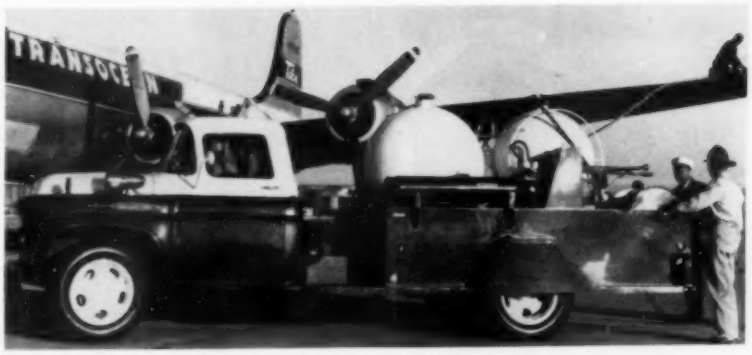


New fire-fighting unit uses dry chemicals

Called the Fire Boss, the new portable fire-fighting unit is easy to use, the maker says. Simply open the nitrogen source and hose nozzles.

An invertible sphere is used to store 1,500 lbs. of nitrogen-propelled dry chemicals. When the unit is idle, the outlets are at the top above the powder level to eliminate the possibility of clogging. When the unit is in use, the sphere is automatically inverted to a working position.

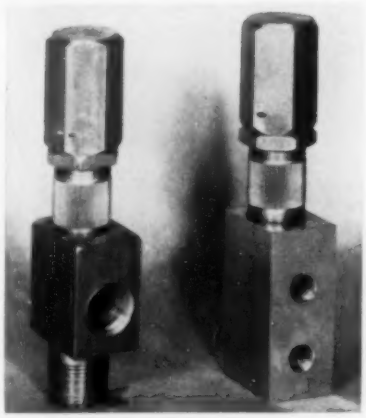
After it's used, the fire-fighting unit can be cleaned and made ready for the next use in a short time. Simply return the sphere to its original position. The remaining nitrogen blows the lines clean. **Write or call: Fire Boss, Inc., 411 West Second, Odessa, Tex., for details on fire-fighting unit.**

Hydraulic Motor-Pump Develops 10,000 Psi.

The portable hydraulic motor-pump weighs only 65 lb. It can be used with pipe benders, pipe pushers, knock-out punches, and hydraulic jacks.

It is also designed for pressing, pushing, or pulling of bushings, bearings, shafts, and pump pistons, and for arbor presses, lifting operations, and prestressing of conduit. It can be used wherever hydraulic power is used. It can be used to replace mechanical power, the maker says.

The pump is rated for 10,000 psi. intermittent and 5,000 psi. continuous duty. Delivering 80 cu. in. of oil per minute, it is driven by a standard, ½-hp., single-phase, 60-cycle, 1,750 r.p.m., 110-220 volt motor. **Write or call: Tal Bending Equipment Co., 419 North Water Street, Milwaukee 2, for details on hydraulic motor-pump.**



Relief Valve for Hydraulic Service Handles 10,000 Psi.

The safety-relief valve (Series 39) for use in hydraulic service is compact. Pressure adjustments range up to a 10,000 psi. setting. Also in production is a Series 44 valve for dry-gas service and a Series 40 for oil-field equipment that handles liquids and natural gas.

All three valves are available in a range of materials, including carbon and stainless steel, the maker says. All can be had with high-pressure instrument threads. All inner-valve parts are easily replaced without tools, the maker reports. **Write or call: Fluid Mechanics Co., P. O. Box 194, Bellaire, Tex., for details on fluid-mechanic valves.**

ISOFLOW FURNACES NOW PROCESSING 300,000 b/d IN CATALYTIC REFORMERS

. . . and more "Isoflows" are being installed in the largest reformers under construction

The continuous production of high octane gasoline by catalytic reforming demands sturdy, efficient, soundly designed equipment. This is especially true of furnaces.

The wide acceptance of Petrochem-Isoflow furnaces is due to their high efficiency, dependable performance even under overload conditions, and their long service life. When you apply all the specifications and operating requirements to direct fired furnace design you'll find Petrochem-Isoflows most economically desirable, by any comparison.

For petroleum, chemical and allied process industries there's a Petrochem-Isoflow furnace for any duty, temperature and efficiency.

The unique design and operating features which have led to the wide acceptance of Petro-Chem furnaces include:

- **Uniform Heat Distribution**
- **Maximum Fuel Efficiency**
- **Low Pressure Drop**
- **Low Maintenance**
- **Zero Air Leakage**
- **Minimum Ground Space**
- **Simplicity of Design and Construction**
- **Short Length of Liquid Travel**
- **Series, Multipass, all parallel flow**
- **Excess Draft for High Overload**

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UNLIMITED IN SIZE . . CAPACITY . . DUTY

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SHOWCASE . . .

New Literature

Maintenance guide . . .

for Traxcavators details fuel-system care and fuel-storage methods. Recommendations are given for lubricants and hourly service intervals. Bucket-linkage and track-component lubrication are reviewed. Hydraulic systems, filters, the oil clutch, and cooling system care are among the maintenance points detailed. **Write or call: Caterpillar Tractor Co., 600 West Washington Street, East Peoria 8, Ill., for Traxcavator Maintenance Guide.**

Oil-well heaters . . .

are described in new Bulletin 27-590. The four-page booklet describes an electric oil-well heater used to increase production of heavy crudes and high-paraffin-content oils. Included are such topics as advantages, construction, applications, installation, operation, and selection of the heaters. **Write or call: Westinghouse Electric Corp., P. O. Box 2099, Pittsburgh 30, for Bulletin 27-590.**

Electric hand dryers . . .

for industrial washrooms are described in new Bulletin AIA-31-L. A dynamically balanced motor on resilient mountings produces quiet, smooth operation of the Sani-Dri, the maker says. A plastic push bar starts operation of the machine. The bulletin includes specifications and applications of the dryer. **Write or call: Chicago Hardware Foundry Co., North Chicago, for Bulletin AIA-31-L.**

Gravity meters . . .

that are lightweight, portable, and have a 0.01 milligal reading accuracy are reviewed in a new four-page bulletin. They are temperature compensated and a direct digital-reader type, according to the maker. The meter's counter can be read without removing the meter from the tripod. And the recessed level bubble avoids direct sunlight and eliminates level-bubble creep. **Write or call: World Wide Instruments, Inc., 3802 South Shepherd Street, Houston 6, for Gravity Meter bulletin.**

Glass pipe and fittings . . .

are discussed in comprehensive 44-page Manual PE-3. Design, engineering, and installation details are illustrated with about 75 charts, graphs, photographs, and line drawings. A section on design explores the applications, advantages, physical characteris-

Fabricated Structural Steel and Fabricated Reinforcing Steel for Bridges, Commercial and Industrial Buildings: Schools, Hospitals, Power Plants, Coal Washing Plants.

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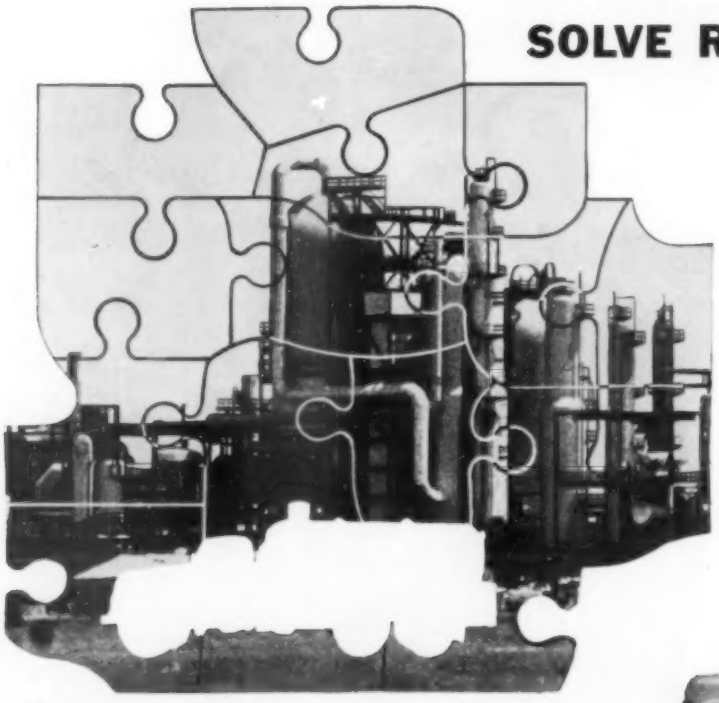
TULSA . . . MEMPHIS



SOLVE REFINERY PUZZLE *Fast!*

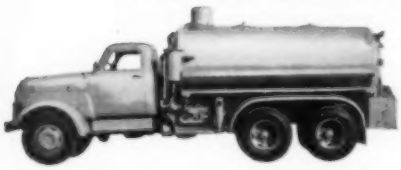
A Thompson Unitized Vacuum Tank is the answer! **Nothing** can take its place for speedy cleaning of tanks, drain boxes, cooling tower basins, and spills.

There's no faster way to move liquids or semi-solids than with vacuum. Pick-up is fast, and reverse pressure built up while "on the road" makes discharge even faster. And, unlike old-fashioned pump tanks, the load doesn't pass **through** the pump!

Standard sizes from 20 to 100 bbls; and units are skid, truck, semi or trailer mounted. Write today for illustrated folder, and a new booklet on Refinery Safety.

This Cost-Cutting Tool

COMPLETES THE PICTURE!



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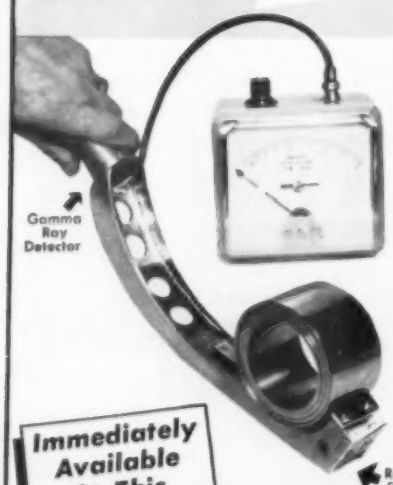
SOLE LICENSEE TO MANUFACTURE VACUUM TANKS UNDER U. S. PATENT NO. 2522077.

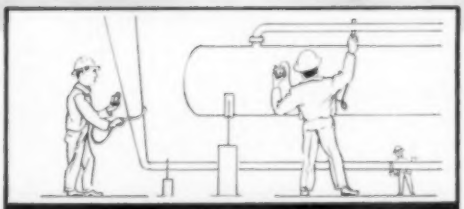
NEW! Transistorized PENETRON



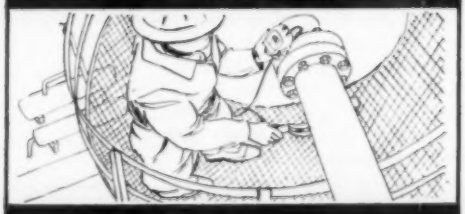
This highly efficient instrument answers the demand for a low-cost, light-weight tool designed to check pipe-wall thickness. The PENETRON M-4 is powered by easy-to-get dry-cell batteries, permanently calibrated for easy readings and needs little or no maintenance.

- ★ HIGHLY ACCURATE . . . 3% of wall thickness.
- ★ STABLE CIRCUIT using transistors.
- ★ PERMANENT CALIBRATIONS
- ★ DIRECT READING . . . of thickness 0 to 1 inch.
- ★ RESPONSE TIME: 10 sec.

Immediately Available At This NEW LOW PRICE
Model 4 for 2" to 8" pipe
$750.00



REDUCES SHUT-DOWN TIME



SPEEDS SPOT CHECKS

UNITED Engineers INC. *Pioneers of Gamma-Ray Inspection Instruments*

824 E. Sixth St. Tulsa, Okla.

tics, and manufacture of the glass pipe. The manual gives recommendations and data on temperature, pressure drop, weight, thermal expansion, and working operating stresses. **Write or call: Corning Glass Works, Corning, N. Y., for Bulletin PE-3.**

Drop-forged fittings . . .

for wire rope and chain Catalog 950-2 includes specifications, dimensions, rated capacities, and weights on all items made by Crosby-Laughlin and Lebus. The line includes wire-rope clips, chain links, clevis links, and weldless sling and end links. Also listed are swivels, shackles, hooks, cargo-handling hooks, turnbuckles, thimbles, sockets, eye bolts, and similar fittings. **Write or call: Crosby-Laughlin Div., American Hoist & Derrick Co., P. O. Box 570, Fort Wayne, Ind., for Catalog 950-2.**

Oil-equipment makers . . .

of the Netherlands have compiled a 284-page catalog of the oil industry equipment being produced in the Netherlands. Over 40 manufacturers' products are included in the book. Products described range from absorbers to valves. Schematic drawings, photographs, dimensions, weights, and capacities are included. **Write or call: Secretary of the Netherlands Oil Equipment Manufacturers, Nassaulaan 13, The Hague, Netherlands, for Oil Equipment Manufacturers catalog.**

Map-racks bulletin . . .

describes four racks designed for compact storage, instant reference, and long-lasting protection. The racks feature ball-bearing casters, graduated steps for easy visibility, and all-steel, welded construction. The different models have 30, 36, 60, and 100 tube capacities. Dimensions and weights are included in the bulletin. **Write or call: Frontier Mfg. Co., 11200 Harry Hines Boulevard, Dallas, for Map Racks bulletin.**

New W-K-M news bulletin . . .

is a monthly report on new products being developed by the company. A catalog listing is included in the booklet as well as examples of products in operation. **Write or call: W-K-M, Div. of ACF Industries, P. O. Box 2117, Houston, for copy of W-K-M News.**

Bulk conveying systems . . .

plus ash-handling, dust-control, and air-classifying equipment are described in new Bulletin GFH-1157. Each system is discussed. Diagrams show their

WHAT ARE YOUR NEEDLE VALVE PROBLEMS?

SIZE . . . ECONOMY . . . HIGH PRESSURE
HI-LOW TEMPERATURES . . . CORROSIVE FLUIDS
PANEL MOUNTING . . . POSITIVE SHUT-OFF . . . SAFETY

TECHNICAL DATA:
- Application ... Production and refinery processing
- Body ... 2024-T4 aluminum
- Stem ... Monel Metal
- Finish ... Anodized
- Working pressure ... 3000 PSI (non-shock)
- Fluid medium ... Cold water, gas or oil @ 150°F
- Mounting ... Regular or test panel (upon request)
- Size ... 1/8 to 1 inch

ALUMINUM BAR STOCK NEEDLE VALVES

TECHNICAL DATA:
- Application ... Corrosive fluids and refinery processing
- Working pressure ... 3000 PSI (non-shock)
- Fluid medium ... Gasoline, crude oil, steam, carbonic acid, alcohol, ammonia and most foodstuffs
- Mounting ... Regular or test panel (upon request)
- Size ... 1/8 to 1 inch

BAR STOCK NEEDLE VALVE

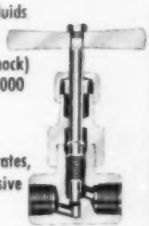
APPLICATIONS

Acetic Acid, Acetone, Alcohol, Ammonia, Calcium Chloride, Carbon Tetrachloride, Chromic Acid, Copper Sulphate, Ethylene Glycol, Hydrochloric Acid, Hydraulic Brake Fluid, Jet Fuel, Liquid Oxygen (lox), Nitric Acid, Oxalic Acid, Phosphoric Acid, Sodium Hydroxide, Sodium Sulphate, Sulfuric Acid, And other Chemicals, Explosives, Plastics, Pharmaceuticals and Foodstuffs.

TECHNICAL DATA:
- Applications ... Gases and Fluids
- Working pressure ... 10,000 PSI (non-shock) @ 150°F
- Fluid medium ... Hydraulic fluids or gases
- Mounting ... Regular or test panel (on request)
- Size ... 1/8 to 1 inch

FORGED BODY NEEDLE VALVE

TECHNICAL DATA:
- Application ... Highly corrosive fluids at high pressure
- Working pressure ... 15,000 PSI (non-shock) @ 150°F - or - 1000 PSI (non-shock) @ 830°F
- Fluid medium ... Ammonia concentrates, other highly corrosive fluids
- Mounting ... Regular or test panel (on request)
- Size ... 1/8 to 1 inch

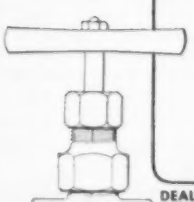


FORGED BODY NEEDLE VALVE

Inherent in every DRAGON Product is the prime consideration of ECONOMIC CONTROL with SAFETY. All threaded chambers are tapped EXTRA deep to permit additional fluid space between pipe ends and the fluid ports. In all Forged Body Valves, the valve stem is controlled by threads tapped in the valve body, NOT in the valve bonnet. By this unique mechanical design, the valve stem remains in a closed position should the valve stop-nut be removed.

DRAGON Products are available in a broad line of types and with a wide range of sizes. Available from stock are valves designed to operate between 150 PSI thru 15,000 PSI in temperatures ranging from 150°F to 830°F (NON-SHOCK). Valves may be fabricated from CARBON STEEL, 303, 316 or 416 STAINLESS STEEL, ALLOY 20, MONEL, 4140 ALLOY or other materials for specific customer applications.

Any catalog product can be modified to meet customer requirements; our Engineering Department will be pleased to assist in the product design for new engineering applications.



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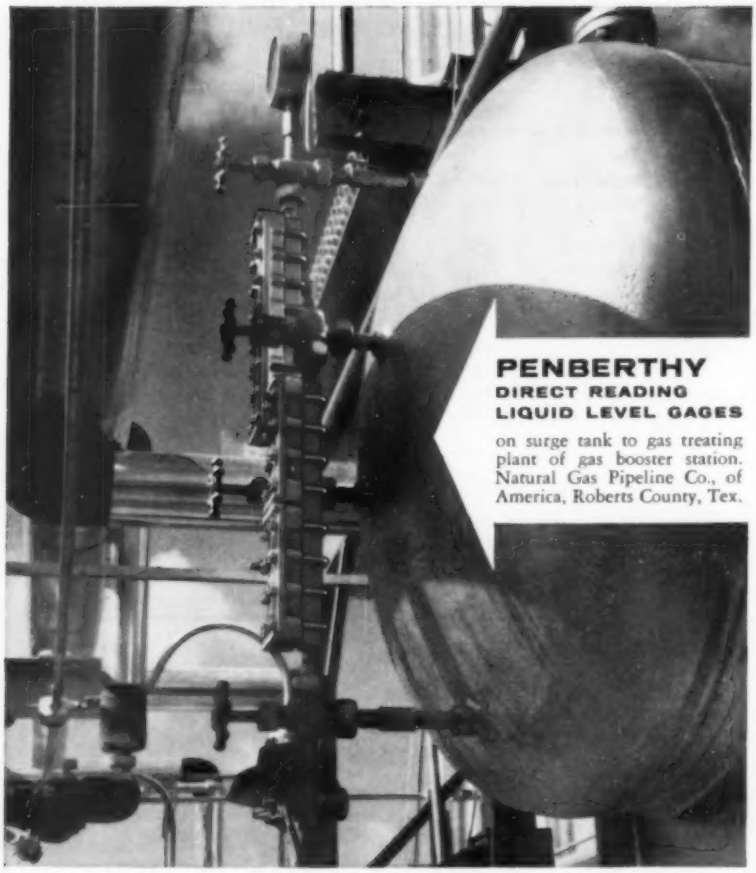
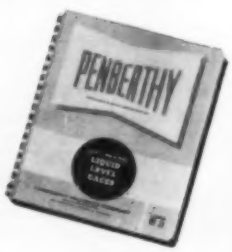


PENBERTHY
DIRECT READING
LIQUID LEVEL GAGES

on surge tank to gas treating plant of gas booster station. Natural Gas Pipeline Co., of America, Roberts County, Tex.

what's so unusual* about PENBERTHY GAGES?

For over 70 years, Penberthy has been designing and making quality products for the Petroleum industry. We specialize in direct reading liquid level gages and valves. Our gages are available in a variety of materials and special designs. And there is also a complete line of accessories. They will meet all practical requirements for measuring and observing liquids (including corrosive) to pressures of 10,000 psi and temperatures of 750° F. They are the one sure means of obtaining positive, accurate readings.



Write for Catalog 36
In this new catalog, the complete line of gages, valves and accessories is described in detail. Technical data and price list are included. Your copy sent on request.

*Penberthy builds into these gages exclusive extra features which assure you easier and lower cost installation, operation and maintenance. Your investigation and comparison will prove there is *certain satisfaction* in products by Penberthy.

Everywhere
YOU'RE SEEING MORE PRODUCTS BY
PENBERTHY MANUFACTURING COMPANY
Division of Buffalo-Eclipse Corporation
1242 Holden Avenue Dept. J Detroit 2, Michigan

PENBERTHY

- EJECTORS
- INJECTORS
- CYCLING JET PUMPS
- ELECTRIC SUMP PUMPS
- LIQUID LEVEL GAGES
- GAGE VALVES

working parts. Engineering services offered and data required for a bid are included. **Write or call: Fluor Products Co., Div. of Fluor Corp., Ltd., Whittier, Calif., for Bulletin GFH-1157.**

Flagstaff Industrial Park . . .

is a $2 million development 4½ miles east of Flagstaff, Ariz., designed to attract industry to the area. The park is composed of 200 acres. Described in detail in a new bulletin, it has a 150-acre railhead and marshalling yard and is the shipping point for the Four Corners area, it is reported. A layout shows the tracts and their relation to Highways 89 and 66 and the rail depot. **Write or call: Flagstaff Industrial Park, Inc., E. B. Myrick, Vice President, P. O. Box 1224, Flagstaff, Ariz., for Industrial Park bulletin.**

Control equipment . . .

used in the boiling-water nuclear reactor at the Argonne National Laboratory is described in a new 10-page bulletin. The maker stresses that the safety equipment used in the installation is available to all types of industry. All Magnetrol units used at the experimental boiling-water reactor are of the maker's standard design, the bulletin points out. **Write or call: Magnetrol, Inc., 2110 South Marshall Boulevard, Chicago 23, for EBWR bulletin.**

Indicating flowmeters . . .

for accurate measurement of liquid and gas flow are reviewed in new four-page Bulletin V-100. The flowmeters are a pointer type actuated by fluid flow upon a movable vane. As the vane rotates with increased inflow, the amount of flow bypassing the vane increases. An adjustable insert permits accurate calibration of each meter to meet operating requirements, the maker reports. **Write or call: Seico Instrument Div., Eclipse Fuel Engineering Co., Rockford, Ill., for Bulletin V-100.**

Welding fittings . . .

made in England are reviewed in a new bulletin. It lists the specifications and dimensions of the line. Elbows, returns, equal tees, caps, reducing tees, welding-neck flanges, slip-on flanges, and concentric and eccentric reducers are described in the bulletin. They are made in stainless steels, chromium-molybdenum steels, aluminum, and Monel. **Write of call: B. K. L. Alloys Ltd., Birmingham Factory Center, Kings Norton, Birmingham, England, for welding-fittings bulletin.**

Welex, Inc., Appoints Morton and Greer . .

to be executive vice president, and vice president, respectively, according to Ray O. Shaffer, president.

T. E. Morton has been vice president in charge of operations since 1957 when Welex Jet Services, Inc.,

T. E. MORTON

W. J. GREER

and the Electrical Well Services Department of Halliburton Oil Well Cementing Co. were consolidated. Prior to joining Welex, he was manager of the California division of Halliburton in Los Angeles. His office is now in Fort Worth.

W. J. Greer is in charge of all engineering and research at the Houston research laboratory. He has been director of research and engineering since 1957 and held the same position with Halliburton prior to that time.

Schlumberger of Canada Names New Personnel

Albert H. Dorin, former manager at Virden, Man., was transferred to Oxbow, Sask. James T. Wilson has been made manager of the Calgary district. The announcement was made by H. C. Gerdes, vice president of the division of Schlumberger Ltd.

Dorin joined the company in May 1951 and has experience in the oilfields adjacent to Edmonton, Peace River, Swift Current, and Virden.

Wilson joined the company in March 1953 and has done work in the oil fields of Saskatchewan. He was manager at Oxbow.

Unit Rig's Equipment Will Use Mid-Continent Name . .

under terms of a new marketing arrangement. The complete line of drilling equipment manufacturered by Unit Rig & Equipment Co. will now be sold by Mid-Continent Supply Co.

A new marketing plan was announced jointly by Ken W. Davis, president of Mid-Continent, and J. L. Vint, president of Unit Rig. The arrangement will provide purchasers of equipment manufactured by Unit Rig service facilities of Mid-Continent in the United States, Canada, and South America.

Unit Rig's facilities will not be affected by the move and will continue to operate as in the past. Factory personnel will continue to service Mid-Continent machinery through Mid-Continent's sales and service organization.

Oilwell's Central Midwest Manager Announces Shifts

Benjamin F. McIntosh, Jr., field representative at Wichita Falls, Tex., has been shifted to Graham, Tex., and Peter H. Tveskov was appointed assistant district engineer, machinery sales, at Odessa, Tex., according to William Miskimins, area manager.

McIntosh was employed in 1952 at Graham and shifted to Gainsville, Tex., in 1953. He was named field representative there in 1954. He transferred to Sherman, Tex., in 1955, and to Wichita Falls in 1957. Tveskov was employed in 1956 at Graham as an engineer trainee.

Garrett, Milton Elected By U. S. Industries, Inc. . .

according to John I. Snyder, Jr., chairman of the board and president. H. U. Garrett was elected vice president of U. S. Industries, and Taylor

H. U. GARRETT

TAYLOR MILTON

Milton, previously executive vice president, was elected president of Garrett Oil Tools Division.

Garrett has been president of Garrett Oil Tools, Inc., of Longview, a division of USI since its acquisition in October 1955. He will be responsible for the operations of all USI divisions which serve the petroleum industry. His duties are in line with the program of organizing USI's manufacturing and sales operations along product group lines.

Milton has been with the company since March 1955. Prior to this he was vice president of Walter Kidde Constructors.

M. J. Crose Manufacturing Co., Inc., Names Officers

Clare G. Miller has been appointed president and T. J. (John) Behrenfeld vice president of this large pipeline construction equipment firm with its headquarters in Tulsa. The announcement, made through the firm's board of directors, was occasioned by the resignation of President D. Michael Curran who will remain active with the company as

C. G. MILLER

BEHRENFELD

D. M. CURRAN

consultant. All three men involved in the organizational shift are known throughout the petroleum industry in the United States and overseas.

Miller was vice president of Crose the past 3 years. Before his affiliation with Crose, he owned and operated The Texas Road Boring Co. in Houston for 7 years.

Behrenfeld joined Crose 9 years ago and has been sales manager for the past 2 years. Previously, he had opened and managed the Crose Houston division for 3 years.

Crose manufactures a complete line of pipeline construction and maintenance equipment. A world-wide market is served by branch offices in several key cities of the United States and by foreign representatives covering more than 30 countries. Crose-Curran, Ltd., a subsidiary in Edmonton, Alta., is the company's Canadian distributor.

SIE Division of Dresser A. G. Expands In Europe . .

according to Reece Hatchitt, president of the European affiliate of Dresser Industries, Inc. Southwestern Industrial Electronics manufactures electronic equipment and instrument systems.

Chris Ring, formerly with SIE of Houston, has been appointed manager of the division. William N. Reese,

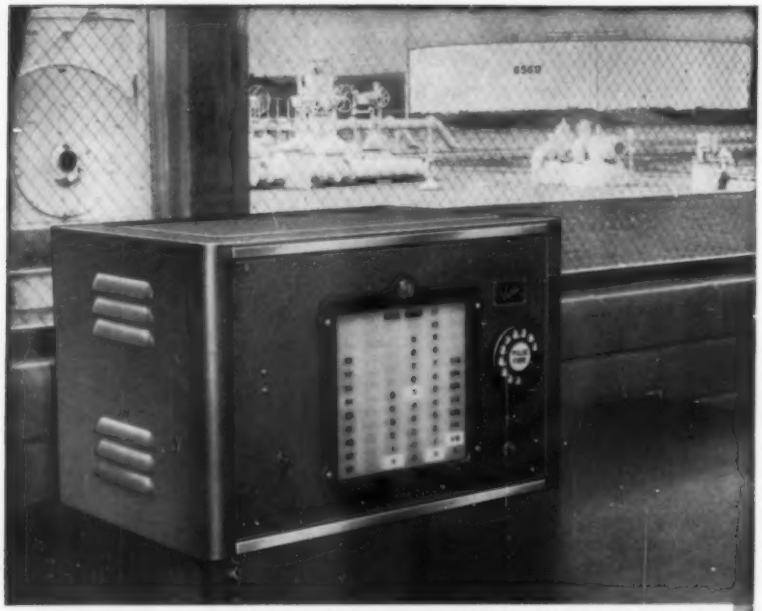


PHOTO - COURTESY SERVICE PIPE LINE COMPANY

VAREC PULSE CODE RECEIVER INSTALLATION AT FT. LARAMIE STA. OF SERVICE PIPE LINE COMPANY

"Varec" PULSE CODE telemetering

Tailored To Your Needs...

In addition to giving an accurate signal on liquid level readings over long distances and doing it in the record time of 5 seconds, the "Varec" PULSE CODE Telemetering System can now perform a great variety of operations. Some idea of the system's flexibility can be obtained by checking these optional features:

1. Pulse Code Receivers with provisions for indicating liquid level, temperature, motor valve or other equipment status, abnormal or alarm conditions and other data as required.
2. Systems incorporating two or more receivers.
3. Systems incorporating two or more receivers and selectors.
4. Receiver with terminal provisions for connecting with data printer
5. Digital clock to be used in conjunction with data printer.
6. Serial entry data printer such as an electric typewriter
7. Parallel entry data printer such as a ribbon type adding machine.
8. Data Programmer to link Pulse Code receiver to data printer
9. Contactor units to provide "on – off" remote control of equipment such as pumps, motor-driven valves, etc.
10. Scanner unit to provide automatic scanning for data logging on a pre-determined time schedule.

With this wide selection of combinations, your "Varec" PULSE CODE System can be custom-built for your particular process..

Write for "Varec" Bulletin CP-3011 for full details of "Varec" PULSE CODE Telemetering.

961-20

THE VAPOR RECOVERY SYSTEMS COMPANY

"Varec"

2820 North Alameda Street
Compton, California

Cable Address:
Varec Compton Calif (U.S.A.) All Codes

formerly with the Houston company, has been placed in charge of technical services.

The expansion will enable SIE to give more attention to customer requirements.

Bovaird Supply Co. Boosts Galbraith, Wilkinson . .

according to a recent announcement. Lyle L. Galbraith has been advanced from store manager and field representative at Abilene, Tex., to city sales

L. L. GALBRAITH

J. C. WILKINSON

representative at Midland, Tex. J. C. Wilkinson has been advanced from field representative at Abilene to the new store manager and field representative at Abilene.

Galbraith joined the company in March 1940 after 3 years experience with other suppliers and manufacturers. From a clerical job in the Tulsa office, he progressed through store assignments in Illinois and Texas until he was promoted from field salesman at Odessa, Tex., to store manager at Snyder, Tex.

Wilkinson joined the company at Lovington, N. M. in 1952. He progressed through various store assignments and in 1953 was promoted to field representative. In 1956, he was transferred from Lovington to Abilene where he was field representative.

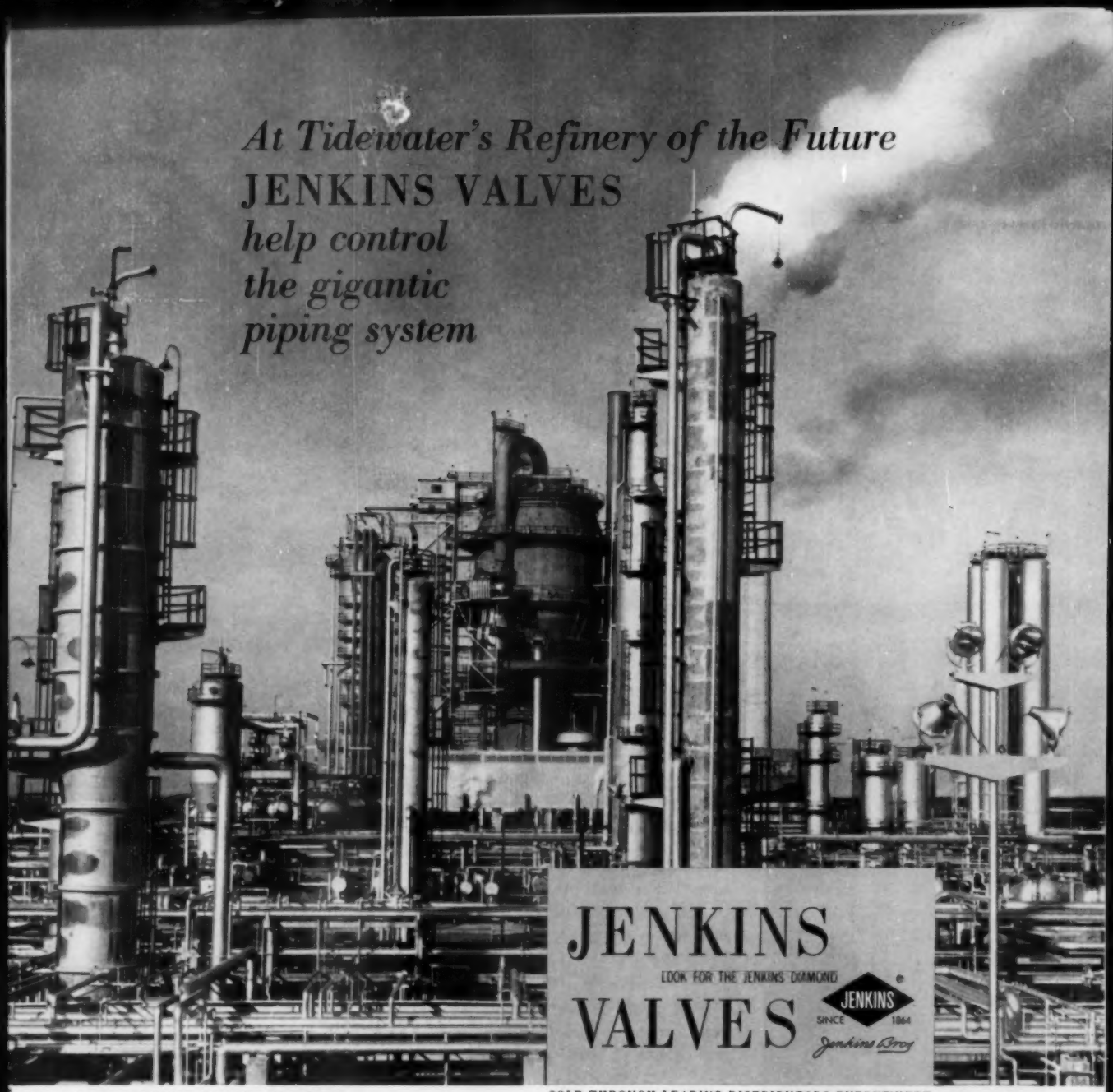
Vertical Turbine Pump Had Tri-Annual Meeting . .

in Houston, February 10 and 11, according to F. E. Dunn, general manager, Turbine Pump division, Worthington Corp., and president of the association.

Members of the association placed particular emphasis on sales methods and training and a review of vertical pump technological advances.

Guest speakers of the 2-day meeting were Dr. John E. Kircher, general manager of the petro-chemical department of Continental Oil Co., and James Harrison, director of market research, Texas Instruments, Inc.

Among the companies represented at the meeting were: Aurora Pump



At Tidewater's Refinery of the Future

JENKINS VALVES

help control the gigantic piping system

JENKINS VALVES

LOOK FOR THE JENKINS DIAMOND

JENKINS SINCE 1864 Jenkins Bros.

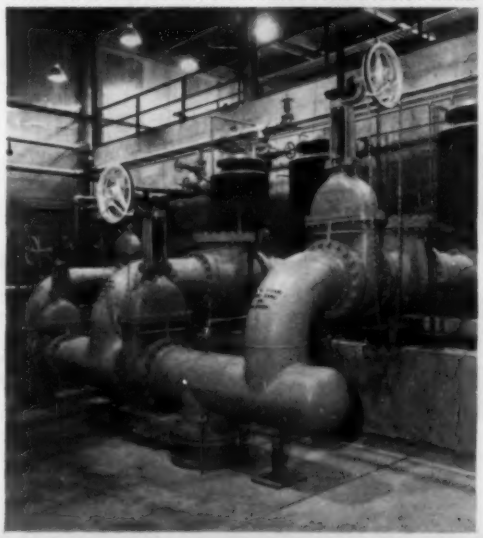
Primary Contractor: C. F. Braun & Co., Alhambra, Cal.

SOLD THROUGH LEADING DISTRIBUTORS EVERYWHERE

For the new Delaware Refinery of Tidewater Oil Company, careful selection of valves was unusually important. Tens of thousands of valves were required to control the maze of piping at this largest refinery ever built at one time.

To the valve specifiers for this gigantic piping project, the long record of Jenkins Valves for an extra-measure of efficient, economical service was good reason for using many thousands of Jenkins Valves in the total valve equipment of the refinery.

It will pay you to have the same important assurance when you specify or install valves . . . especially since Jenkins Valves cost no more. Jenkins Bros., 100 Park Avenue, New York 17.



These large valves made of Ni-Resist metal are among the thousands of Jenkins Valves in this great refinery. Sizes range from ¼" to 24"; made of various metals to suit different services.

Standardize with WECO Unions on all your piping for leakproof connections and simplicity of make-up. When you standardize with WECO Unions no time is lost in locating matching unions. WECO Unions in same sizes and pressures not only match perfectly with each other but are unsurpassed for making and holding a tight seal under all conditions of surge and vibration.

Full circle contact of the ball and cone metal-to-metal seats always makes a tight seal.

Save money and time, standardize on WECO Unions, proved best on the hardest service applications. At your Supply Store in sizes 1″ through 12″, pressures 1,000 psi through 15,000 psi.

U-6-58

WELL EQUIPMENT MFG. CORP.
HOUSTON, TEXAS

WECO Division of CHIKSAN COMPANY *a subsidiary of* FOOD MACHINERY AND CHEMICAL CORPORATION

Division, The New York Air Brake Co.; Byron Jackson Division, Borg-Warner Corp.; The Deming Co.; Fairbanks, Morse & Co.; Fiese & Firstenberger Mfg., Inc.; Johnston Pump Co., division of the Youngstown Sheet & Tube Corp.; Layne & Bowler Pump Co.; Layne & Bowler, Inc.; Peerless Pump Division of Food Machinery & Chemical Corp.; Wintroath Pumps, division of Worthington Corp.; and Worthington Corp.

C. C. Sublett Appointed By Gulf Forge Co. . .

C. C. SUBLETT

as sales manager, according to Neil Nuttall, president and general manager.

Sublett will direct the sales promotion activities of the company from the Houston headquarters. For the past 7 years he was district representative for a supply company.

Christensen Shifts James Whitaker, Percy Tinsley . .

according to W. R. Pratt, president, Christensen Diamond Products Co.

Whitaker will be returning to the United States sometime in April. He

J. WHITAKER

PERCY TINSLEY

has been representing Christensen in the Near East, headquartered in Beirut, Lebanon. Upon his return, he will be located at the main office and plant in Salt Lake City, Utah.

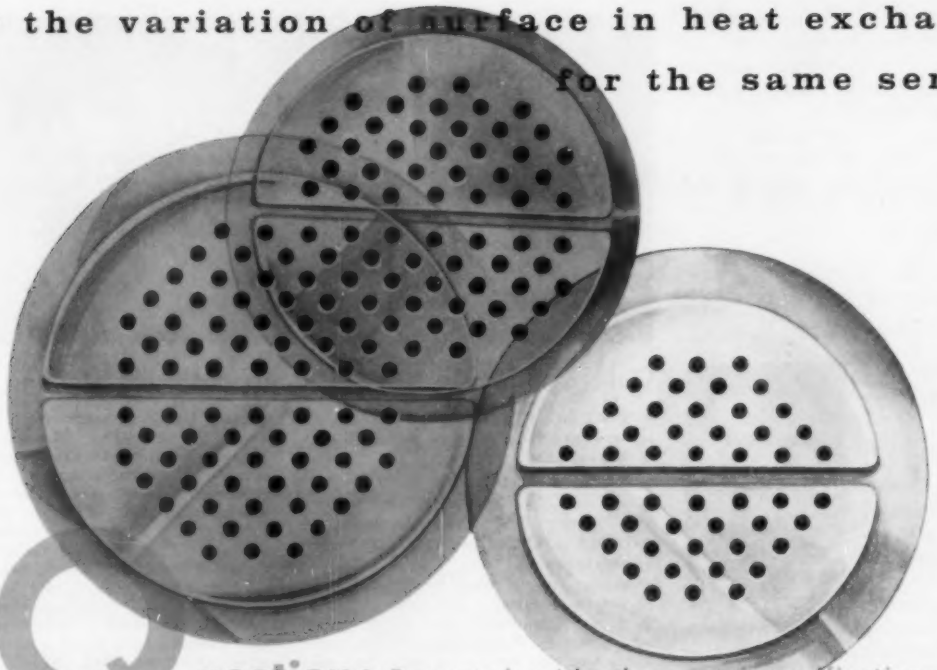
Tinsley, former Gulf Coast area representative, will become the new representative in the Near East. He will work with R. J. Eiche & associates, Inc., Christensen export representatives.

Dresser Manufacturing Division Makes Changes

Charles Kuhn was named sales manager, regular products, and Stephen B. Hodges, former manager of marketing, was made director of market planning and control of this division of Dresser Industries, Inc.

E. R. Torgler, works manager, was

Why the variation of surface in heat exchangers for the same service?



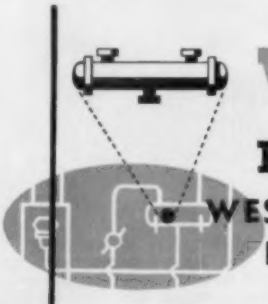
Question: Presented with the same specifications, what justification is there to the variation of surfaces offered by a number of reputable suppliers of heat exchanger equipment, for a given service?

Answer: Since heat transfer calculation to date is not an exact science, the data on which design curves are based may vary over a wide range, and EXPERIENCE is often the deciding factor, SO THAT . . . .

. . . . Western's years of experience in heat exchanger design, with both the small independent refiners as well as with the giants of the industry, are a great asset in helping you select the equipment you need for your *specific problem.*

Personal attention to detail and knowledge of customer preferences are integral in each Western-customer relationship. Utilizing the most modern methods and machinery in rating and fabrication results in achieving the highest heat transfer efficiency at realistic prices.

Western specifies the surface to fit your specific service — no more and no less.



WESTERN

HEAT EXCHANGERS

WESTERN SUPPLY COMPANY

P. O. Box 1888 – Tulsa, Oklahoma

boosted to director of manufacturing for Dresser Manufacturing and its subsidiaries. J. R. Harrahill, assistant to the general manager, was appointed acting works manager.

Kuhn was formerly general sales manager of Hills-McCanna Co. Prior to this, he was vice president and sales manager with Fansteel Metallurgical Corp.

E. R. Huckman Boosted By The Foxboro Co. . .

E. R. HUCKMAN

to be assistant field sales manager, according to H. O. Ehrisman, sales manager. With field sales manager J. J. Burnett, Huckman will coordinate sales engineering activities of field personnel in the northern and eastern sales regions. Huckman will continue as regional manager of the New York area, including sections of Connecticut, New Jersey, and New York. His duties as manager of the New York City branch have been assumed by H. R. Cushman, formerly sales engineer at New York.

Process Equipment Co., Inc. To Handle Brodie Meters . .

According to a joint announcement issued by the Denver, Colo., firm and Ralph N. Brodie Co. of San Leandro, Calif. Process Equipment will handle sales and distribution of Brodie Meters and allied equipment in the Intermountain area. Brodie meters are used in production, pipeline, wellhead, and refinery services.

The company will represent Brodie in Montana, southern Idaho, Wyoming, Utah, Colorado, and portions of New Mexico.

General Paint Corp. Held Its Annual Sales Meeting . .

in Tulsa recently. Coating problems of the oil and gas industry were a major topic of discussion.

Under the supervision of W. L. Watkins, president; T. M. Pennington, vice president and Woodrow Clift, district manager, the meeting was devoted to giving better service to the industry.

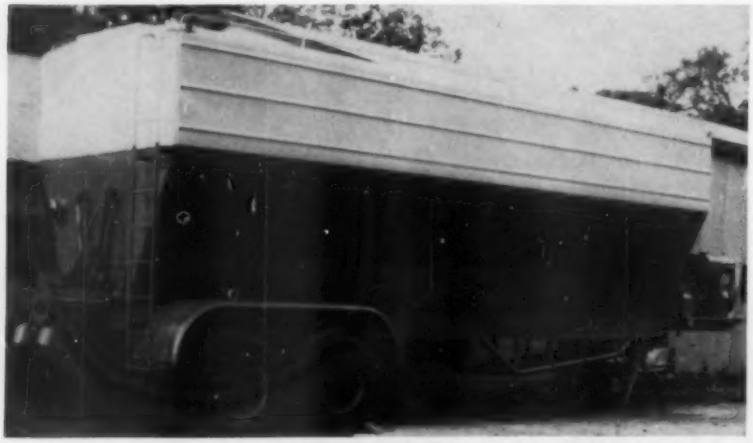
Shown at the meeting, first row: Lee Orf, purchasing agent; Rex Dykes, Dallas branch manager; Ralph Nackerud, Denver branch manager; E. C. Touchstone, sales representative, Amarillo, Tex.; E. A. McKinney, sales representative, Wichita; John Robinson, assistant district manager, Tulsa; Harold Campbell, sales representative, Amarillo; Nathan Carter, district credit manager, Tulsa; Fid Borchardt, sales representative, Denver; Ed Bradford, Tulsa branch manager; Clift, district manager, Tulsa; George Howard, industrial sales, Tulsa; Pennington, vice president, San Francisco. Second row; Ed Payne, sales representative, Tulsa; Clarence Hummert, San Antonio branch manager; Watkins, president, San Francisco; Carl Ballew, Oklahoma City branch manager; Dr. K. J. Keating, chief chemist, Tulsa; J. C. Heyser, sales representative, San Antonio; Dale Barnes, sales representative, Oklahoma City; W. H. Smith, industrial sales, Tulsa; Jay Heller, advertising, San Francisco. Not pictured, J. M. McGinnis, industrial sales, Tulsa.

EPECA Is Formed to Serve Venezuelan Oil Industry

R. E. MURPHY

Equipo Petrolero Compania Anoima will engage in the sales and service of Harold Brown Co. gas-lift equipment.

Principal officers include Robert E. Murphy, president; Ed T. Malloy, executive vice-president; and Lamar W. Davis, Jr., vice president in charge of engineering. Murphy and Malloy are also associated with Levingston Shipbuilding Co. at Orange, Tex., which will operate a new shipyard, now under construction in Maraciabo, known as VAZCA.



BJ Service, Inc., Uses Portable Bulk Cement Bin . .

to serve Lake Charles, La., area. The 1,200 cu. ft. field bin was designed and fabricated for BJ Service by Rig Engineers & Fabricators Co., Inc., Houston.

Flow of material from the 4-compartment bin is controlled from an operating station adjacent to the twin outlets at the rear of the unit. By using hydraulic and mechanical devices, this control station can govern the selection and the rate of flow of material from any of the four compartments.

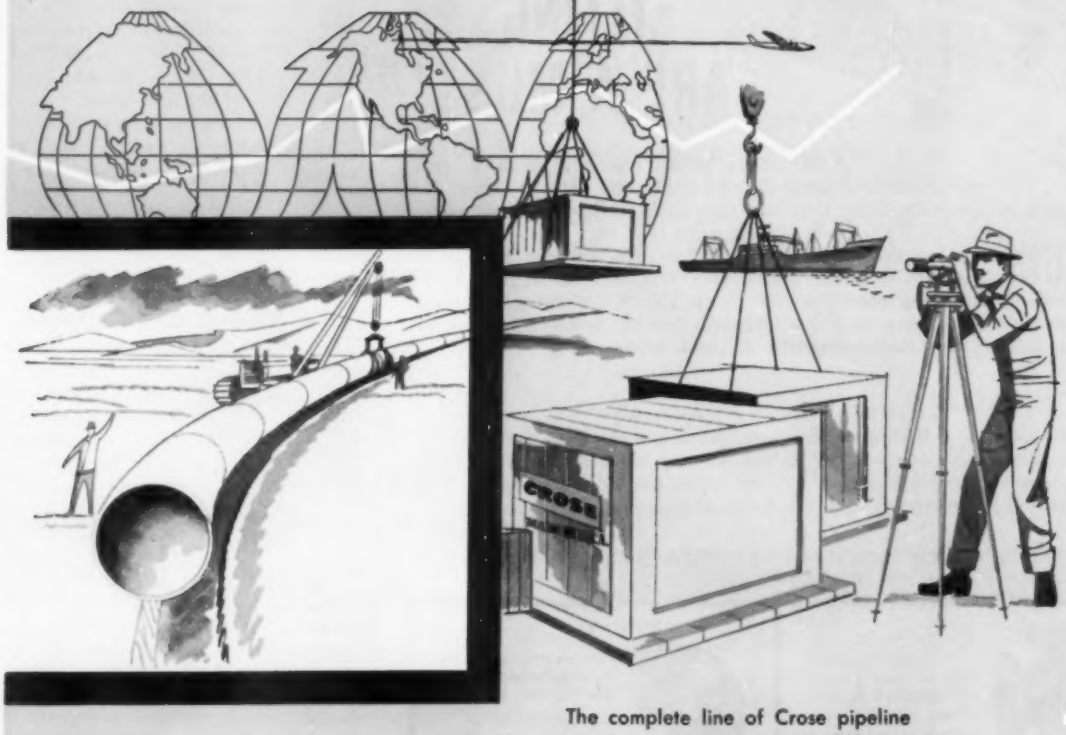
I. H. Grancell Co. Names Quenell, Sefton . .

as general manager and sales manager, respectively. These appointments are the initial move in a stepped-up sales promotion program. The company has appointed the following representatives who will serve key areas throughout the oil country.

A. D. Eastham, Borger, Tex.; Harries Sales & Rentals, Odessa, Tex.; R. W. Howell, Wichita Falls, Tex.; Bill Lee, Corpus Christi, Tex.;

CROSE

WORLD-WIDE SALES EXPERIENCE IN PIPELINE CONSTRUCTION EQUIPMENT



The complete line of Crose pipeline construction equipment is sold in most countries around the world through our highly experienced export sales department and its foreign representatives. Crose equipment on the job — anywhere — means extra efficiency and economy.

EQUIPMENT
LINE TRAVELING AND STATIONARY CLEANING — PRIMING MACHINES
COATING — WRAPPING MACHINES,
PIPE BENDING MACHINES,
CUTTING AND BEVELING MACHINES,
LINE-UP CLAMPS,
PIPELINE DITCH PADDER,
ROAD BORING MACHINE, KETTLES,
PIPE CRADLES,

AND FULL LINE OF PIPELINE MATERIALS AND SUPPLIES.

M. J. Crose
MANUFACTURING COMPANY, INC.

2715 Dawson Road • Tulsa, Oklahoma
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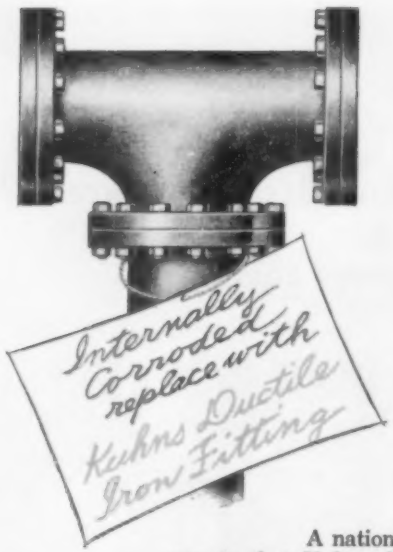
EXPORT OFFICE: New York, N. Y., Ph. BRyant 9-2236.

FOREIGN REPRESENTATIVES in: Argentina, Bolivia, Colombia, Chile, Australia, Austria, Yugoslavia, Belgium, France, Brazil, Germany, Hawaii, Israel, Italy, Middle East, Turkey, South Africa, Trinidad, Venezuela and Mexico.

DISTRIBUTOR: CROSE-CURRAN LTD., *Edmonton, Alberta, Ph. 3-5135 • *Winnipeg, Manitoba, Ph. SPruce 4-1851.
*Warehouses in 5 locations



IF YOU'RE HANDLING CORROSIVE FLUIDS...

K DUCTILE IRON FITTINGS ARE A MUST!

A nationally known chemical manufacturer reports that Kuhns ductile iron pipe fittings lasted six times longer in raw water lines than ordinary fittings. The brackish water at 80° C. contains 100-2000 parts chloride per million.

They also report excellent results with flanged ductile iron fittings on pumps operating up to 200° C. Other uses reported for Kuhns "DI" fittings include handling oleum at 40° C. to 100° C., steam at 125 psi, steam condensate, nitrogen at 175 psi, carbon dioxide at 150 psi, propane, ammonia, isobutylene, isobutane, and all weak acids.

SAFETY FACTOR

The smooth walls of Kuhns ductile iron fittings, their basic resistance to corrosion, high yield strength of 45,000 psi and excellent thermal shock resistance mean greater plant safety and lower maintenance costs wherever corrosion or volatile fluids are handled.

LISTED BY UNDERWRITERS' LABORATORIES, INC.

"K" Flanges and Flanged Fittings

Elbows, base elbows, 45° elbows, side outlet elbows, tees, side outlet tees, and reducers in straight and reducing sizes. Pressure rating, 500 psi by Underwriters' Laboratories, Inc. Flat faced flanges shipped as standard. Extra heavy flange dimensions and raised faces available on request. Look for the "DI 500" on each. Complete range of sizes through 12".

"K" Screwed Fittings*

Pressure ratings listed by Underwriters' Laboratories, Inc.

STEAM AND OIL AT 550° F.
¼" to 3" ..... 300 lbs.

LIQUID AND GAS AT 150° F.
¼" to 1" .....2000 lbs.
1¼" to 2" .....1500 lbs.
2½" to 3" .....1000 lbs.

NOTE: These fittings are excellent for liquefied petroleum gas systems. Look for the "DI 300" on each.

*Ductile Iron fittings are available in any size in Kuhns' complete cast iron line, ¼" through 12".

From the melt in modern electric furnace through to critical inspection, these fittings are made in accordance with A.S.T.M. specifications A-339-55, A-395-55T to provide nodular structure and highest quality to meet industry's strictest requirements.

"K" fittings are available nationally through better wholesalers.

K THE KUHNS BROTHERS CO.

1800 McCall Street • Dayton, Ohio

1887—71 Years of Continuous Progress—1958

Houston Sales Co., Houston; Sales & Service Co., Morgan, La.; E. E. Gardner, Shreveport, La.; Ray Cunningham, Harvey, La.; Ray W. Cash, Oklahoma City; Leo W. Mauck, Great Bend, Kans.; and Jerrold Drexel, Edmonton, Alta.

National Supply Co. Forms Wellhead Equipment Unit . .

with headquarters in Dallas. R. B. Hill has been appointed wellhead sales supervisor and will head the newly-established sales unit.

Earl Hensley, Jr., will serve as wellhead sales representative at Houston, Bill Mitchell at New Orleans, and H. H. Vaughn, Jr., at Odessa, Tex., as members of the new unit.

Hill joined the company in 1941 and has engaged in wellhead sales as sales engineer out of Houston since 1955.

E. L. Dressel Heads New Tretolite Co. Field Lab . .

E. L. DRESSEL

at Odessa, Tex., according to a recent announcement. The Tretolite facilities have been enlarged to double previous capacity. The new laboratory will facilitate all Tretolite service in that area. Dressel served for 5 years in the company's research department where he worked on corrosion inhibitors. For the past 2 years he has helped carry out the company's service and development laboratory program. He will correlate liaison between field and central laboratory in the development and research program. He succeeds James H. Burrell, Jr., who recently was named assistant to John L. Hampton, manager of the West Central division at Midland, Tex.

Two Texas Firms Named By Quaker Rubber Division . .

as distributors of industrial rubber products of the division of H. K. Porter Co., Inc.

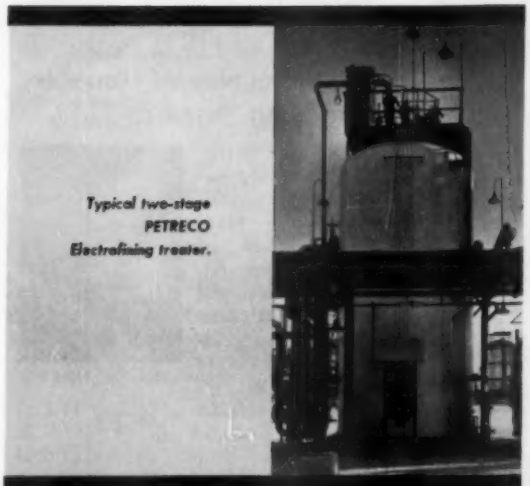
F. W. Heitmann Co., Houston, will be Quaker's distributor in the Harris County area, and Jess McNeel Machinery Corp., San Antonio, will cover the San Antonio, Austin, West Texas, and Rio Grande Valley areas.

Both distributors will carry a complete line of industrial rubber products and industrial rubber hose. Engineering specialists and field representatives

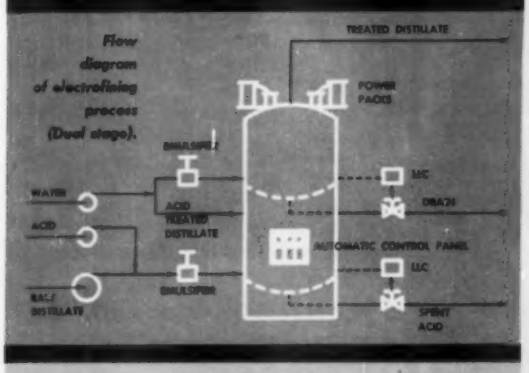
PETRECO

ELECTROFINING REDUCES ARSENIC CONTENT FROM 100 PPB TO 4 PPB

INCREASES OCTANE NUMBER... IMPROVES CATALYST LIFE FOR OKLAHOMA REFINERY



Typical two-stage PETRECO Electrofining treater.



Flow diagram of electrofining process (Dual stage).

BEFORE INSTALLING PETRECO ELECTROFINING EQUIPMENT, this Oklahoma refinery passed straight-run naphtha for reformer charge stock through its clay tower. Only half of the arsenic was removed by this treatment, and the clay lasted but a week or two. The result was a low catalyst yield.

AFTER THE PETRECO ELECTROFINER was put into operation, the same stock was treated with one lb/bbl of 90% spent alkylation acid, followed by a water wash which maintained a pH of 6.5 to 8 in the treater effluent water. The following table shows the treating results:

	BEFORE PETRECO Electrofining	AFTER PETRECO Electrofining
Arsenic (ppb)	100	4
Lead (ppb)	600	20
Sulfur (%)	.028	.015
Clay Life (days)	7 to 14	Changed only when reformer was down.
Octane of product	Normal	Normal
Catalyst Yield	Low	Up 30%
Water Carry-Over	—	Less than .001%

Petreco Electrofining can be installed *for about 1/10th the cost of hydrotreating.*

If you have a treating problem, it will pay you to investigate Petreco Electrofining first!

WHERE IS PETRECO ELECTROFINING EQUIPMENT BEING USED TODAY?

Applicable to all distillate stocks, Petreco Electrofining is currently being used to treat such stocks as straight-run gasolines and naphthas, jet fuels, burning oils, diesel fuels, vacuum distillates, lube oils, gas oils, heavy cat naphthas, alkylates and many others.

HOW IS IT BEING USED?

Petreco Electrofining is successfully removing mercaptans, naphthenic acids, sulfur, tarry acids, hydrogen sulfide, arsenic, lead, color bodies and gum formers.

PETRECO

DT-58-1

A DIVISION OF PETROLITE CORPORATION

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Specialized Petroleum Treating Processes and Equipment

DESALTING • DEHYDRATING • DISTILLATE TREATING • SWEETENING • LUBE OIL TREATING • SEDIMENT REMOVAL

will be available in connection with the application and use of any Quaker products through the new distributors.

Philco Corp. Appoints Transac Computer Manager

John M. Nisbet has joined the industrial division as sales manager of the Transac computer department. In making this announcement, H. E. Taylor, Jr., marketing manager for industrial products, stated that Nisbet would have complete responsibility for all computer sales.

Logan, Kirby, Barnes New District Sales Managers . .

for Manning, Maxwell & Moore, Inc., according to M. S. Palmer, manager of field sales.

Robert L. Logan, formerly in charge of the company's Southeast sales district in Atlanta, Ga., has been named manager for the Mid-Continent district out of Tulsa. Succeeding Logan in Atlanta is Lamar F. Kirby, formerly company sales engineer.

Arthur H. Barnes has been appointed district manager for the Pacific Coast, headquartered in Los Angeles. He succeeds E. H. Price, who has retired.

L. H. Dean Named Manager, Marketing Research . .

for J. B. Beaird Co., Inc., Shreveport, La., according to John MacKinnon, director of product research and development division.

L. H. DEAN

In his new position, Dean will supervise Beaird's marketing research program, including market studies and surveys, as well as economic and statistical analysis to uncover new product opportunities in the oil, gas, and petrochemical industries. Beaird serves these industries with packaged compressor plants, pressure storage vessels, piling for offshore drilling, rail car tanks, cast steel fittings, and other products.

Dean was formerly market research manager of the Forest Products Division of Olin Mathieson Chemical Corp. in West Monroe, La.

The Ohio Injector Co. Names Winder to Post . .

G. R. WINDER

as vice president of marketing, according to Roger E. Bremer, executive vice president.

G. R. Winder joins O. I. C. from Chiksan Co., Brea, Calif., where he held a similar position. He succeeds William G. Shepard, who has resigned.

The company is launching a newly aligned marketing program geared to the growth requirements of petroleum, chemical, utility, and shipbuilding industries. Winder has been associated with these industries since 1940.

Page Oil Tools Announces Appointment of Dirksen . .

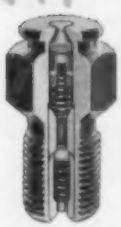
to its field sales and service staff, according to John S. Page, president.

N. R. Dirksen worked as salesman for O'Meara & Rogers Construction Co. from 1955 to 1957 representing a general line of oil-well equipment. He had previously spent 14 years with Sargent Engineering Corp. as pump salesman.

DELTA HIGH PRESSURE GUN

This is no ordinary gun. It incorporates many important advantages and safety factors. Handles heaviest lubricants. Develops 10,000 lb. pressure. Positive mechanical spring primer. 30,000 lb. test barrel is cold rolled seamless steel tubing with heavy end sections and safe coarse threads. Hose tested to 20,000 lbs. Fast snap-on coupler enables operator to lubricate 10 to 15 valves *better, faster* and *safer* than he can one valve by conventional methods.

DELTA "GIANT" API BUTTON HEAD FITTINGS



These are the only guaranteed button head fittings on the market. Unconditionally guaranteed not to leak at 15,000 lbs. pressure. Why can we do this? Because they have a one-piece steel body. Precision parts. Double check valves; metal-to-metal seats. There are sizes and types for any plug valve in any service. Holds valve pressure, retains lubricant, protects personnel. Insist on them.

DELTA-DESCO

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Color Coded Lubricants • Hand Guns
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Blaw-Knox Co. Announces Appointment of Kohlins . .

as general manager of its Buflovak equipment division, Buffalo, N. Y. He has been serving as division manager since 1956.

William D. Kohlins joined Blaw-Knox in 1946 as sales manager of the New York office, transferring to Buffalo in 1954 as director of engineering.

Cance and Farrow Named Foreign Representatives . .

by Ideco, Inc., and its affiliates Dresser A. G. and Dresser International, Inc., according to Geo. W. Walton, Ideco president.

Georges Cance has been named European manager. He will handle European sales of Ideco products

GEORGES CANCE W. L. FARROW

made in the United States, and by European licensed manufacturers.

W. L. Farrow has been appointed director of South American operations for the Ideco Division of Dresser International, with offices in St. Augustine, Trinidad.

Cance will be associated with Societe Francaise des Industries Dresser, S. A., an affiliate of Dresser Industries, with offices in Paris. His experience includes work with Steaua Romana and Socony - Vacuum, and commercial and technical positions with S. N. Marep and Societe D'Etudes Petrolieres.

Farrow was formerly managing director of Edeco (Trinidad) Ltd., a subsidiary of English Drilling & Equipment Co. He worked as a roughneck, driller, and tool pusher in Kuwait and Trinidad before joining Edeco.

Pfaudler Appoints Three To New Sales Positions

The Pfaudler Division of Pfaudler Permutit, Inc., has appointed Robert E. Smith former assistant manager of chemical sales to vessel sales manager, and H. E. P. Barta as machinery sales manager. Elmer Wright has been promoted to customer service manager.

The W-S double diamond brand mark symbolizes more than a century of pioneering manufacture in the fields of pipe fittings and hydraulic jacks and pumps.

For almost a century the Cleveland brand has marked industry's best automotive and industrial hardware and commercial forgings and die casting.

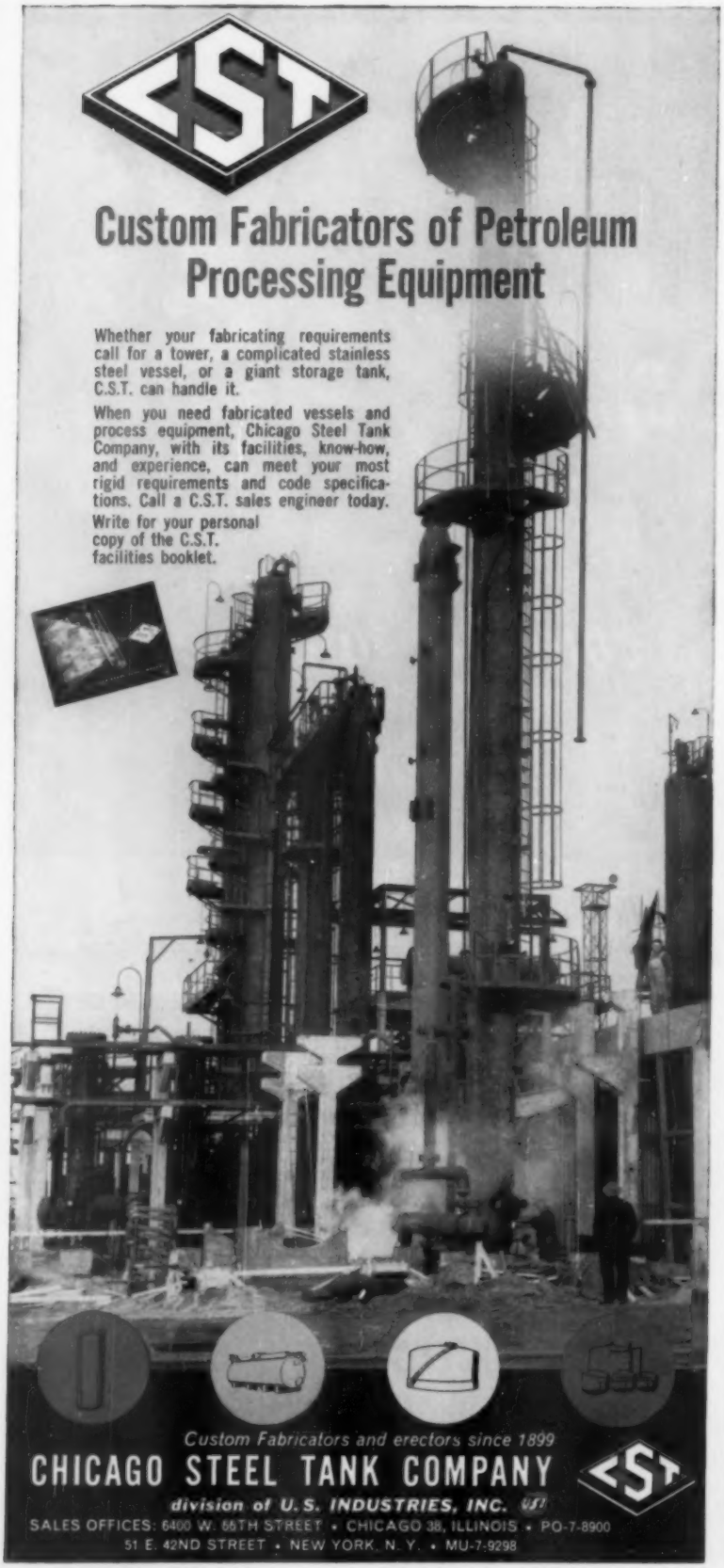
Now, the two manufacturing organizations which bear these brands have combined to continue and enlarge their line of quality products and to increase service to you through exchange of technical experience and through distribution facilities from coast to coast. Now, from one source, you may obtain the finest in forged carbon, stainless and alloy steel pipe fittings, unions and couplets; hydraulic jacks and pumps; stock forgings for trucks, buses and other vehicles; commercial forgings and die castings for all industry.

This means additional service from the growing facilities of H. K. Porter Company, Inc., where planned diversification has resulted in a product for every industrial plant.

H. K. PORTER COMPANY, INC.

FORGE AND FITTINGS DIVISION

W-S Fittings Works, Roselle, N.J. • Cleveland Forge Works, Cleveland 4, Ohio
Stainless Steel Works, Duncannon, Pa. • Cleveland Die Cast Works, Cleveland 4, Ohio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Donald C. Deyle becomes advertising manager.

Barta was formerly in charge of project engineering sales, and Wright formerly served as company sales correspondent.

Delta Tank Appoints J. E. Massey and J. S. Perry . .

as chief engineer and district sales manager, respectively, at the Houston office. The announcement was made by Hal S. Phillips, president of Delta Tank Manufacturing Co., Inc.

J. S. PERRY

J. E. MASSEY

Massey joined Delta, a subsidiary of General Gas Corp., in 1954 after experience with a steel fabricating firm in Houston. His first position was sales engineer. Later he was named district sales manager at Houston for Delta's pressure vessel division.

Perry joined the company early this year, and has served in sales capacities in Houston and Tulsa.

Robert L. Williams Boosted By Gardner-Denver Co. . .

to advertising manager, according to G. V. Leece, president.

Williams was with the advertising department of Cincinnati Milling Machine Co. from 1938 to 1942. He joined Keller Tool Co. in September 1945 and was manager of its advertising department at the time of Keller's merger with Gardner-Denver in 1955. He was put in charge of advertising for the company's industrial products in 1957, after serving as assistant advertising manager.

Houdry Process Corp. Names G. F. Hornaday . .

as manager of the research and development division, Theodore A. Burtis, president, has announced.

Hornaday, who had been associate manager of the division since December 1956, heads operations at the Linwood, Pa., laboratories. He was assistant process sales manager of the company, which licenses processes used in the petroleum refining and petrochemical industries, makes and markets catalysts, and conducts re-

Pacific Process Pump **EXTRAS** bring **EXTRA PROFITS** to you!

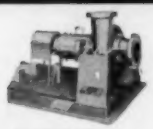
EXTRA CORROSION ALLOWANCE—All Pacific Process pumps are custom-built with case casting thickness in excess of actual pressure-temperature requirements. This provides a liberal allowance for corrosion-erosion and a high safety factor.

EXTRA HEAVY CONSTRUCTION—Pacific process pumps are engineered to combine the strength necessary for continuous heavy duty service with design simplicity and accessibility for low maintenance cost. All parts in contact with pumped liquid may be fabricated from any commercially available ferrous or non-ferrous metal.

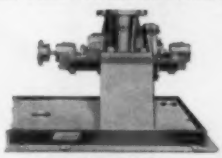
EXTRA LONG LIFE—Guided inlet flow reduces friction losses—insures minimum required NPSH. Dynamically, radially, and axially balanced moving parts eliminate vibration that would cause damage to rings, bushings, bearings, packing or mechanical shaft seals and excessive radial and thrust loads on bearings. Result—greatly increased availability for profitable operation.

Write for bulletins—please specify pump type.

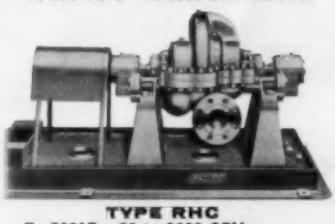
MAXIMUM PARTS INTERCHANGEABILITY
is an extra feature in
PACIFIC PROCESS PUMPS



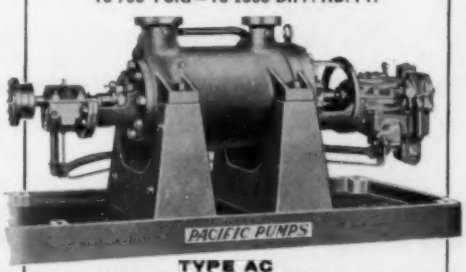
TYPE SVC
To 850°F.—25 to 3200 GPM
To 600 PSIG—To 650 DIFF. HD. FT.



TYPE HVC
To 850°F.—600 to 4500 GPM
To 600 PSIG—To 1000 DIFF. HD. FT.



TYPE RHC
To 500°F.—50 to 3000 GPM
To 700 PSIG—To 1300 DIFF. HD. FT.



TYPE AC
To 850°F.—100 to 2500 GPM
To 1000 PSIG—To 2600 DIFF. HD. FT.

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..... for high or low-speed centrifugal, rotary or reciprocating pumps.

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Here in one bulletin is illustrated and described industry's most complete line of chemically inert packings. You'll save time, trouble and expense on fluid or gas handling problems by requesting Bulletin P-325.

Crane Packing Company, 6419 Oakton Street, Morton Grove, Illinois (Chicago Suburb). *In Canada: Crane Packing Co., Ltd., Hamilton, Ont.*

search and development projects for industrial clients.

Prior to joining Houdry in 1940 as assistant manager of development, Hornaday was with Socony Vacuum Oil Co.

McJunkin Corp. Announces Three New Appointments . .

W. H. BEEGLE

for its Pennsylvania operations. William H. Beegle, formerly Pittsburgh district manager, has been appointed Pennsylvania division manager in charge of all operations in Pennsylvania including the Chandler-Boyd Co. John B. Shriver has been appointed manager of warehouse operations, and Albert J. Conley will be manager of order department of the Chandler-Boyd subsidiary.

McJunkin has general offices in Charleston, W. Va.

New Distributor Added by Polyken Sales at Houston

The Polyken Sales Division of The Kendall Co. recently enfranchised Cathodic Protection Service, Houston, to provide increased service for the Southwest area. The new distributor maintains branch offices in Tulsa, New Orleans, La.; Corpus Christi and Odessa, Tex.

James T. Brockman Joins The Elgen Corp. . .

J. T. BROCKMAN

and will be stationed in Abilene, Tex., according to C. A. Strozier, manager of the Tulsa office. Brockman has been engaged in electrical logging, perforating, and auxiliary services for 11 years before joining Elgen.

Lucey Export Corp. to Represent Tube-Kote . .

as export sales representative in Brazil and Argentina. Lucey's representative in Rio de Janeiro is Oscar Bernardes.

Tube-Kote, Inc., applies baked phenolic coatings to oil field tubular goods for prevention of corrosion and paraffin deposition. Plants are located in Houston and Harvey, La.

OPW Corp. Equipment Shown On West Coast . .

to representatives of major and independent oil companies, industrial concerns, and engineering firms by sales and engineering executives of OPW and Jordan Corp., OPW's industrial sales division.

The first West Coast showing was held in San Francisco and the second in Los Angeles. Both occasions were a showing of equipment for bulk storage and liquids handling, for refining of gasoline products, and for other industrial applications.

OPW's West Coast jobbers in attendance were: Dawn Associates, of Southgate and Oakland, Calif.; Nebar Supply, Seattle, Wash.; Burch Equipment, Sacramento, Calif.; Hallidie Machinery Co.; and Salisbury Equipment Co., Spokane, Wash.

Union Switch & Signal Gets Order From Bristol Co. . .

for a pipeline centralized transport control system to control valves at New York State Natural Gas Co.'s Petersburg and Coxcomb stations located 56 and 18 miles, respectively, from the dispatch office at Pittsburgh. Pa.

The installation will include Bristol analog computers and metameter telemeters that will record corrected readings on the quantity of gas flow at Gateway Center.

The division of Westinghouse Air Brake Co. will furnish cabinets and the control panel for the entire system, and will mount and wire the analog and computer instruments and communications equipment supplied by Bristol.

BS&B Establishes New Venezuelan Division . .

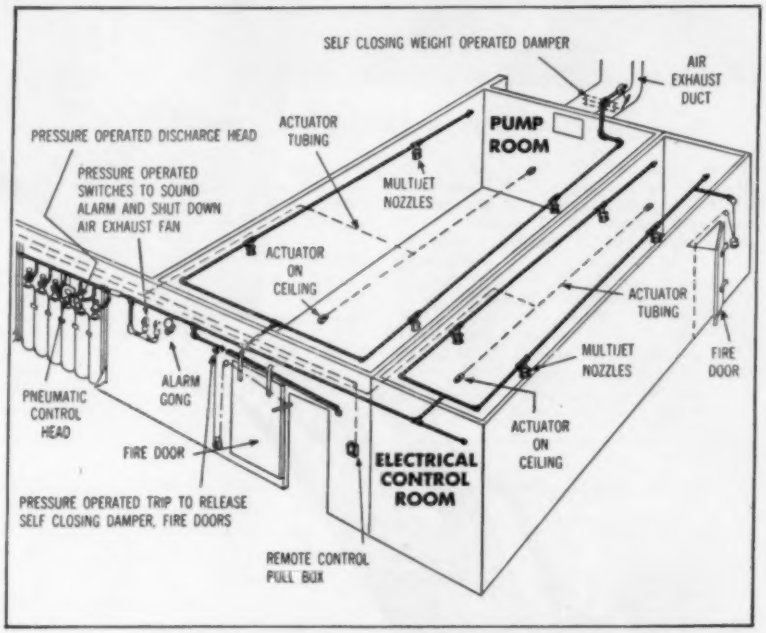
with offices at Caracas, Maracaibo and Anaco, according to Kenneth W. Lineberry, president. With this new division, BS&B, a wholly-owned subsidiary of Black, Sivalls & Bryson, Inc., brings to the Venezuelan oil industry an organization equipped to handle application problems, including the lease automation.

Allen Pike, formerly of Oilfield Sales & Service, S. A., has been appointed manager at Caracas.

Two new branch operations have been established at Anaco and Maracaibo to provide warehousing for parts, controls, and major oil-field equipment items.

Eugene L. Seale has been appointed branch manager at Anaco, serving eastern Venezuela. James H. Clayton

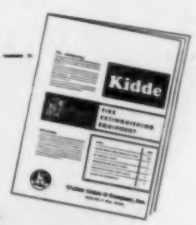
STOP PUMP ROOM FIRES THE INSTANT THEY START!



Most dependable fire protection on the market today, a built-in Kidde Fully Automatic Carbon Dioxide Fire Extinguishing System gives you 24-hour-a-day protection, guards even the most dangerous of fire hazards.

Pressure-operated for the utmost in dependability, Kidde systems use no falling weights, no clumsy mechanical triggering methods. Special rate-of-temperature-rise detectors trigger the system at the first sign of fire, pneumatic control heads insure instantaneous and complete carbon dioxide discharge. Automatic electric actuators also are available. In a Kidde system, all moving parts are self-enclosed for safety, and visual indicators show at a glance whether the system is "set" or "released."

To help you solve your fire protection problems, Kidde has prepared an informative booklet which fully explains Kidde Automatic Fire Extinguishing Systems, how they work, and how they can save you money in your business. For your copy, fill out the coupon below or write to Kidde today.



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RIGHT FOR A GIVEN SERVICE

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The blue dye in the Canadian asbestos filler indentifies Flexitallic Gaskets for engineers who want the right gasket for each sealing requirement.

Whatever the service conditions may be—vibration, weaving, thermal and mechanical shock, and other joint stresses—the precision design and construction in Flexitallic Gaskets are your assurance of satisfactory service.

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*Flexitallic is a registered tradename. No one else can make a Flexitallic Gasket. Look for *Flexitallic Blue* — it's our exclusive blue-dyed Canadian asbestos filler.

has been appointed branch manager at Maracaibo to serve western Venezuela. Thomas Burkhead will serve as sales engineer at Maracaibo.

Pike was with the production department of the Mene Grande Oil Co. at Caracas. Seale was formerly sales engineer for Oilfield Sales & Service, production engineer for Houston Oil Co. in Houston, and Mene Grande Oil Co. in Venezuela. Before joining BS&B, Clayton was sales manager for Automation Products, Inc., at Midland, Tex. Burkhead comes from BS&B's oil-field engineering department.

Robert Muddiman Co. To Handle W-K-M Products . .

in Canada, according to B. J. Gross, vice president, marketing, for W-K-M. The adding of ASA through-conduit gate valves, Key West, and Key refinery fittings together with the ACF plug valve which Muddiman is handling for W-K-M now, will offer a complete line of valves and fittings for the Canadian industry.

The company, with offices in Toronto, serves the entire eastern part of Canada. W-K-M with its office and plant in Missouri City, Tex., is a division of ACF Industries, Inc.

Annual Sales Meeting Held By Bethlehem Supply Co. . .

covered discussions on the new Bethlehem drilling and production equipment, as well as the general sales activities. The meeting was under the supervision of I. C. Smith, general manager of sales.

Attending the meeting were 48 sales officials of the company coming from 8 states and Canada, including all division sales managers, resident sales managers, and district managers.

Front row are: L. V. Nowlin, Arthur Weber, Jr., L. R. Estes, H. A. Barnes, L. G. Bettis, V. G. Stahl, O. H. Crowe, F. I. Mobley, G. V. Furrow, I. C. Smith, G. B. Sager, H. E. Davidson, R. L. Timmons, J. V. Spalding. Second row: C. H. Wilmeth, H. R. Powers, Christian Seger, Jr., H. A. Wilson, D. L. Brown, Lee Fagg, Wendell M. Jones, F. R. House, C. R. Zimmerman, J. F. Eaton, D. C. Thomas, W. J. Brady, J. B. Ellzey. Third row: L. A. Myers, V. W. Bailey, G. L. Reid, W. E. Stephenson, E. R. Phillips, H. V. Harder, W. T. Davis, C. R. McNair, E. S. Lewis, W. M. Sanders, T. C. Graham, T. M. Tallon, W. F. Taylor, P. H. Jezzard, R. B. Dearing, J. G. Floyd, R. A. Johnson, C. C. Crider, S. A. Barnes, and H. L. Hawkinson.

National Tank Co. Acquires Instruments, Inc. . .

through an exchange of stock, according to Jay P. Walker, president of National Tank.

The Instruments firm, a manufacturer of electrical controls and other automatic equipment, will implement the oil-field equipment produced by National Tank in the fields of LACT, oil metering, refining, pipeline, and other automatic operations.

Instruments was organized in 1948 to manufacture a radiation-type liquid level control. A second radiation-type control, a line of diaphragm-type liquid level pressure transmitters, and capacitance actuated high and low level switches, were also marketed.

In 1953, Instruments purchased Telematic Corp. of Chicago, a manufacturer of float-type liquid level gages, used in refinery tank farms. The electronic division of R. S. Products Corp. of Philadelphia was also purchased. The company was licensed to manufacture capacitance-type cut point indicators in 1954.

O. W. Graham, president, and J. S. Whatley, secretary-treasurer of Instruments, will remain in the same capacity with the new subsidiary. Other officers and directors include: Walker, chairman of the board; C. G. Wells, executive vice president; F. W. Baker, assistant treasurer; Don Turner, assistant secretary; A. W. Francis, Jr., and C. O. Glasgow, directors.

Wells, Walker, Graham, and Whatley complete the transaction resulting in the purchase of Instruments by National Tank.

O. W. Wade Forms New Corrosion Control Firm . .

known as World Supply Co. with offices in Houston. The firm specializes in engineering services related to corrosion control in the petroleum and pipeline industries. Wade, president of World Supply, has been chairman of the American Gas Association's corrosion committee, heading its instrumentation committee, and has served on its committee for development and screening of internal pipe coatings.

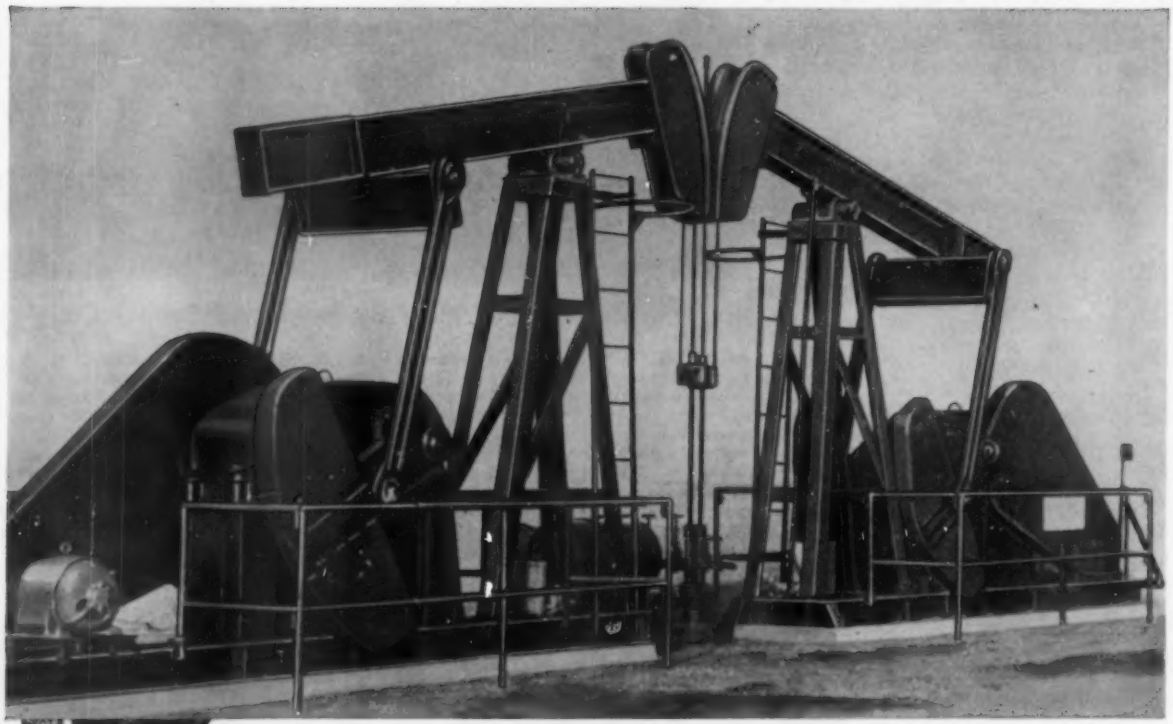
Formerly chief corrosion engineer for Transcontinental Gas Pipe Line Corp., Wade directed the firm's program of research and development in the fields of external and internal pipe coating.

R. C. Ayres, Jr., Named Sales Representative . .

for Flori-Houston. His territory is the Gulf Coast area, Texas, southern Arkansas, and Louisiana, including accounts in Houston.

Ayres has 12 years sales experience with mechanical and industrial firms in the gulf area, and 4 years experience in small plant management.

He has served as plant manager, manufacturers' agent, and secretary-treasurer and sales manager for a cooling tower manufacturing firm.



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On these Parkersburg chain driven pumpers, 98-99% of the input horsepower is delivered to the output shafts to pump oil. In addition, Diamond drives deliver the *same high efficiency throughout their entire long life.*

Efficient Diamond Roller Chain drives mean less horsepower is required to do a specific job. This drive efficiency saves money—and keeps on saving money since Diamond drives do not depend on tension as with belts or critical tooth mesh as with gears.

Look for the Diamond Oil Country Roller Chain on leading makes of equipment. When you buy replacements, specify Diamond. More oil country stores carry Diamond for your convenience than any other.

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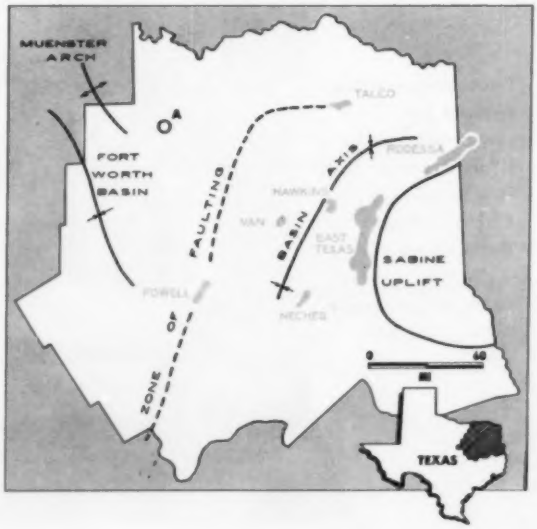
Of mice and elephants

BY FRANK J. GARDNER



FIFTY YEARS of exploration has uncovered seven giant fields in East Texas. The last of these was found at Neches in 1953, but operators continue the search for more.

THREE THOUSAND geologists sat up with a start about 10 days ago. Sitting in convention in Los Angeles, the membership of AAPG and SEPM was startled to hear the president of the SEG deliver a bare-knuckled guest address that left them in a fog of self-doubt.

O. C. Clifford, Jr., was the speaker. He is both geologist and geophysicist. He works for a major oil company. And he was quite sincere when he warned the oil finders that they were near the end of the rope. Phrases such as "we are pricing ourselves out of the market" and "we must admit failure" had never before been so candidly spoken before this group. And the candor was sorely needed. The 1957 reserves report just released by the API confirms that, for the figures certainly reflect failure in that year.

The early bird . . . Clifford was not without hope, however. He climaxed his address with a forceful recommendation. Simply stated, it advised the oil finder to become an early bird and go looking for worms. It was a subtle warning that geologists and geophysicists must sell management on looking in new areas for new oil. In the United States, this means looking in such places as the vast, sparsely drilled basins of the West, on the Continental shelves, and in Alaska There are still many new spots to look for oil. And early birds will find good hunting in them. Shell Oil Co. and The Texas Co., for example, were early birds in the Paradox basin, though to some even earlier explorers, Paradox had become a dirty word.

It has always been the tendency in exploration to follow the crowd. This is the "me too" approach, and an understandable one. It's largely to blame, however, for much of the oil finder's predicament today. The geologist himself is not wholly responsible, for he must sell his ideas to his bosses. On this point, President Clifford also had a word: "Let's not forget next time to tell the boss sooner when all the elephants are hunted out and only mice remain."

Can capture elephants . . . Most of our drilling today is concentrated in a few old, established places. In many of them, the elephants have been captured and the oil finder is simply trying to build a better mousetrap.

A good example of this situation is East Texas. In the 46 counties covered by the map above, only 7 elephant fields have been found in the course of a 50-year drilling campaign. It's been 5 years since the last of these was captured at Neches, and wildcatters today are bagging only mice. Yet, in 1957, this was one of the few places where drilling activity was **up** from 1956, and if the first 2 months of 1958 are any sign, it will be up again this year. Total completions in January and February reached 245 (versus 227 for the same period in 1957) and of these, 72 were wildcats (67 at the same time last year).

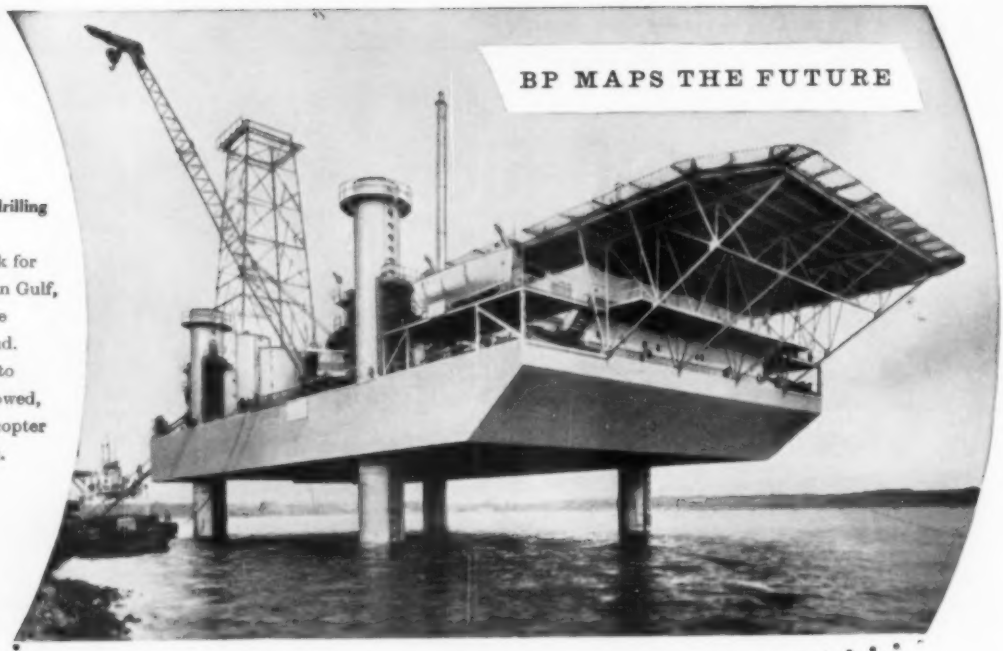
The success ratio in East Texas doesn't seem to justify this activity. Of the 72 wildcats drilled in January and February, only 2 were hits. That's less than 3%. In all of 1957, a paltry 5% success ratio was scored. That's 1 out of 20, less than half of the national average.

Can we say, then, that in East Texas only the mice remain? If the drilling density were evenly distributed, perhaps we could. But examine your maps and you'll find that most of the drilling has been concentrated east of the zone of faulting that splits the province in two. Might there not be elephants west of this line? At least one company is betting that there are. At A on the map, Humble Oil & Refining Co. is making a third deep try in northwestern Collin County at its 1 Sims et al. Hole will be dug to 12,500 ft. here, despite two earlier failures to 11,407 ft. and 12,175 ft. at locations very close by.

At home or away . . . To become an early bird, then, you needn't take wing to faraway places. Just try over the fence, away from the crowd. Or you can take a fling in any number of completely dry basins. You could hardly do worse than 1 out of 20 if you rely on your geologist's advice, even in New Hampshire.

We haven't exhausted all the places to drill in the United States by any means. Any oil finder can think of several basins comparable to East Texas that still offer fertile prospects, but that are now condemned by some convenient rule-of-thumb, such as "too deep and too expensive," or "sure the structures are there, but there is no reservoir rock." It takes bold and imaginative thinking to flout these time-honored doctrines, but the result can be another Neches, or a drilling spree such as the one we are seeing today in the Paradox basin.

BP MAPS THE FUTURE



This underwater drilling barge has just commenced work for BP in the Persian Gulf, 80 miles from the Arabian mainland. The legs retract to enable it to be towed, and it has a helicopter landing platform.

Can oil supplies be doubled in the next ten years?

TODAY THE WORLD is using twice as much oil as in 1946. So far, production has kept pace with demand. At its expected rate of increase, by 1966 demand may well have doubled again. What is being done to meet this situation?

The answer is that exploration in known and suspected oil-bearing areas is proceeding on a colossal scale. In this world-wide operation the BP Group of Companies and its Associates are engaged, in some twenty countries, at an investment cost running into millions of dollars.

BP is also increasing the capacity of its fourteen refineries; adding new vessels to its 2,000,000-ton tanker fleet; expanding its marketing system, which already covers a great sweep of the globe, from Canada through Europe to Asia, to New Zealand. In 1946 the world used a hundred and fifty million barrels of BP products; in 1956 four hundred million.

The ever-increasing demand for oil must be met: no organisation in the world is working harder to meet it than The British Petroleum Company.

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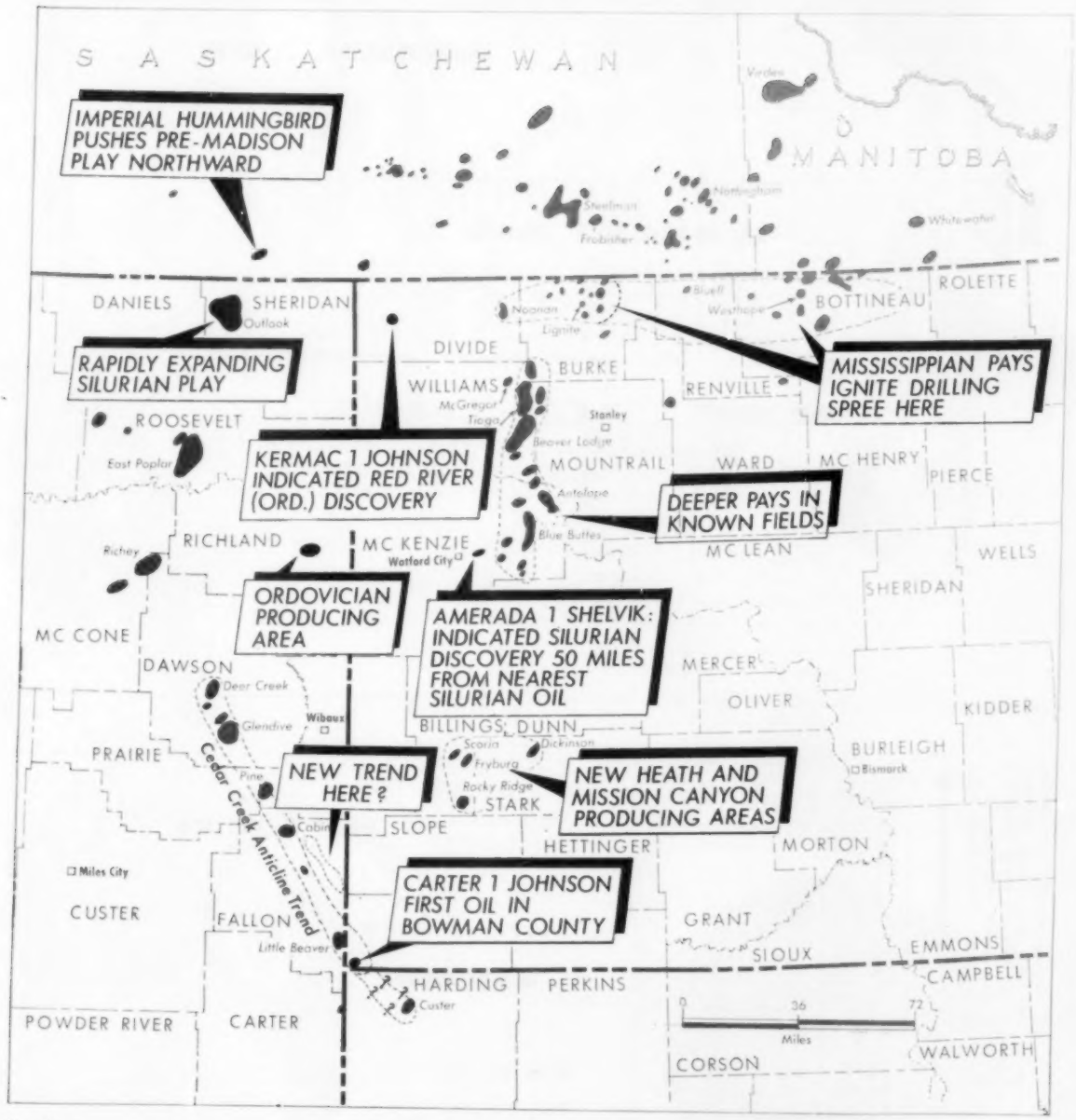


Fig. 1

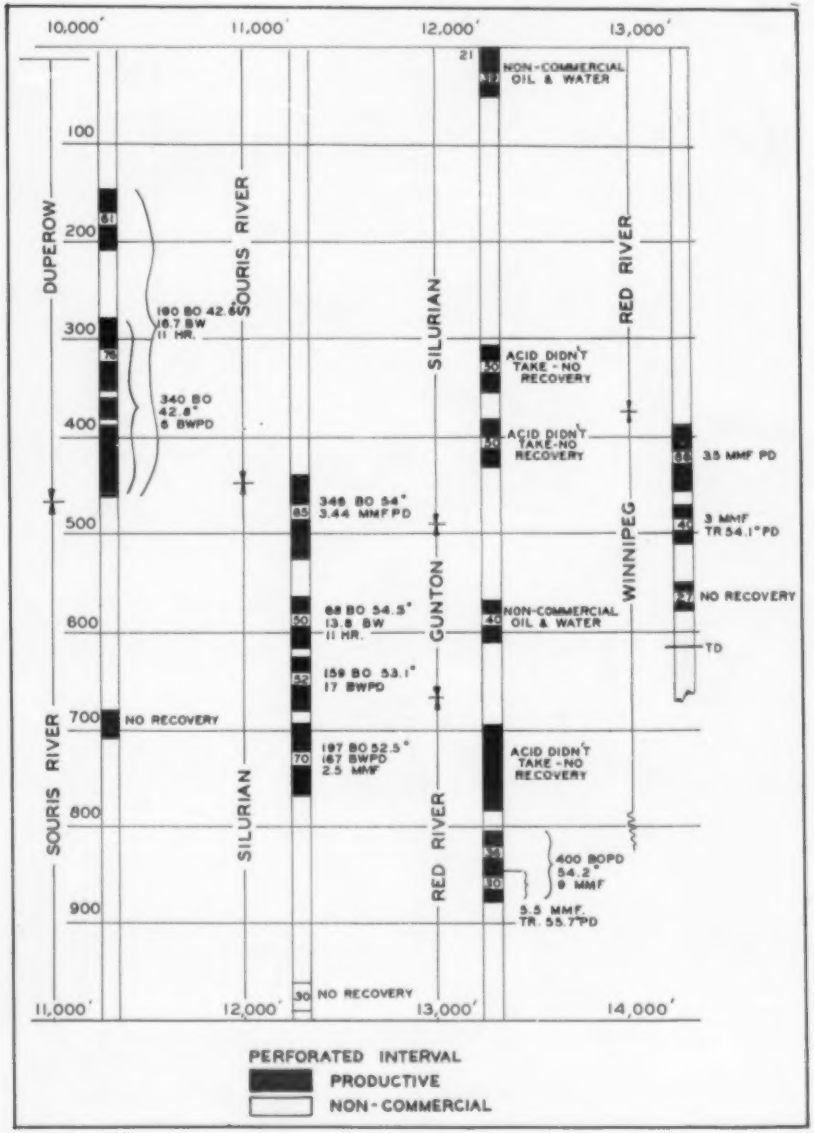
DEEPER PAYS below the Madison are converting Williston basin into the hottest area in the Rockies. As an area that produces largely from "carbonate" rocks . . .

Williston may rival West Texas

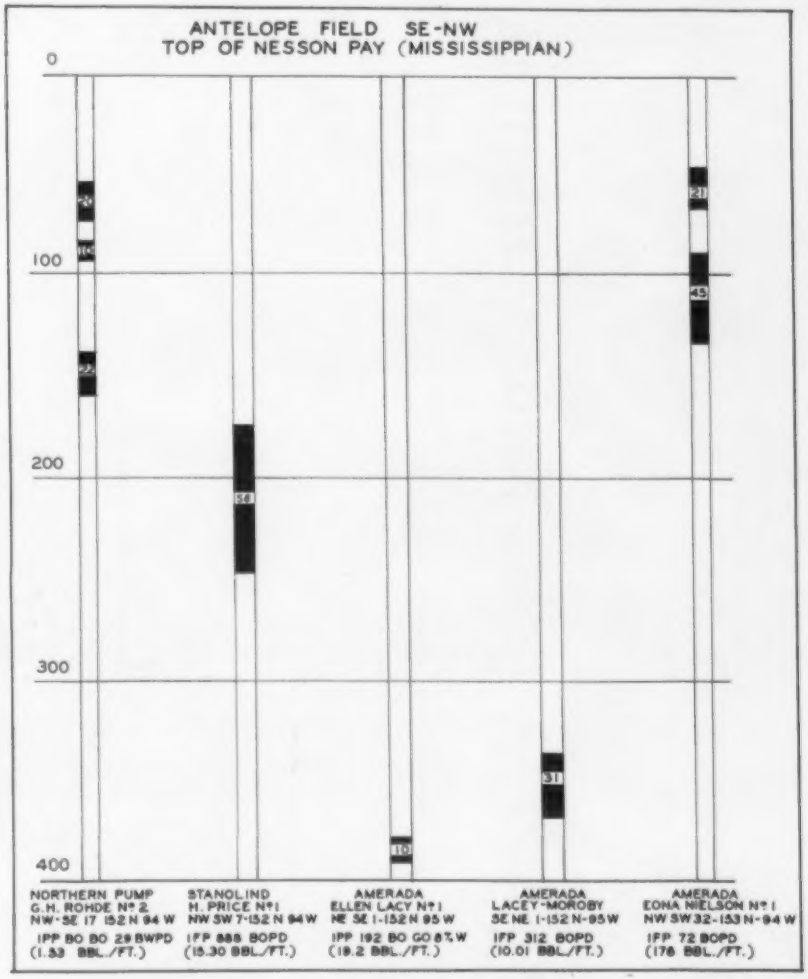
BY NORMAN S. MORRISEY
Drilling-Development Editor

RECENT DEEP TESTS in the Williston basin have opened oil finders' eyes to the tremendous possibilities of the pre-Madison section. The Williston basin (Fig. 1), unlike so many Rocky Mountain areas, produces primarily from carbonate rocks. Until recently the main pay zone was the Madison Mississippian limestone. On the Nesson anticline, this formation has proved reserves in excess of 210 million barrels.

Now, however, the deep pay zones, below the Madison, are coming into prominence. Probably the most significant wildcat completed since the first production in the basin is Amerada Petroleum Corp.'s 1 Iverson-

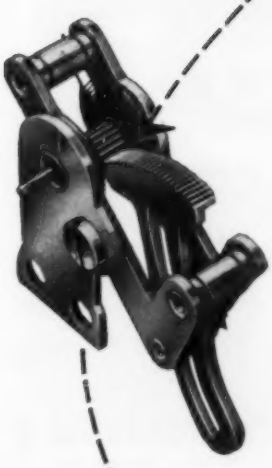


BEST GAGE of how good the deep pays in the Williston basin will be is this summary of the pre-Madison tests taken through perforated intervals in the Amerada 1 Iverson-Nelson. Fig. 2.



ANTELOPE, a fairly recent Madison producing area, has a gross pay section of 400 ft. Fig. 3.

Marsh alone has this "coined" sector gear...



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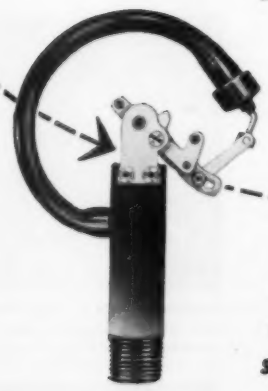

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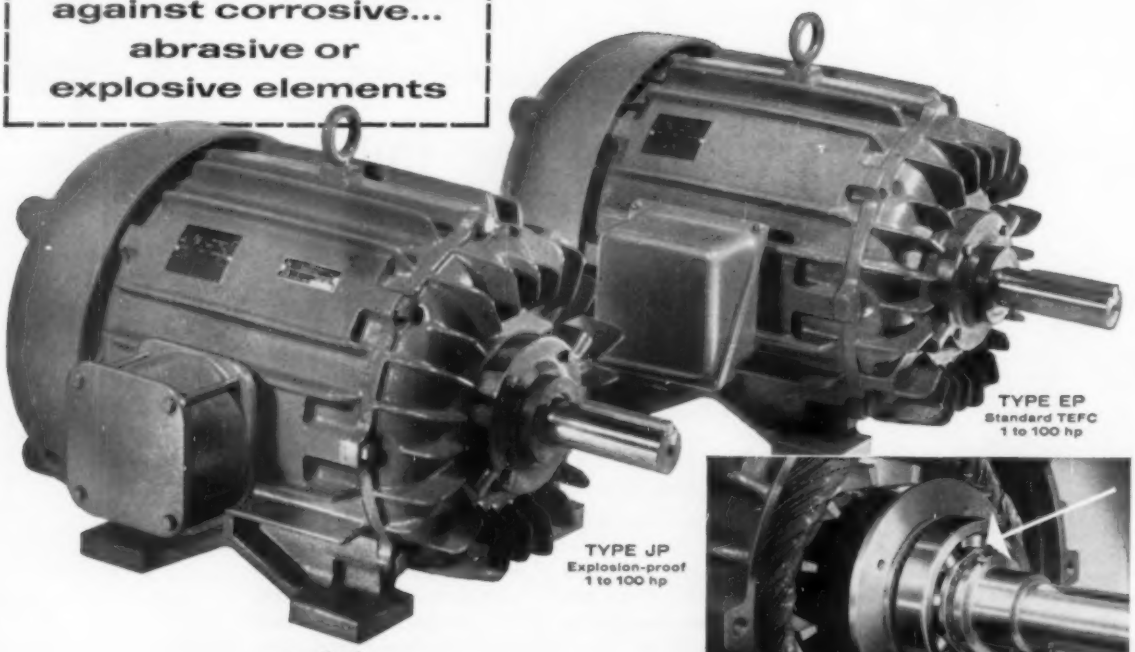

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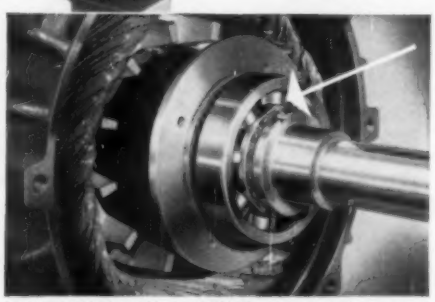

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WILLISTON CORRELATOR

AGE	FORMATION		PRODUCES AT	IN . . . MANITOBA	SASKATCHEWAN	NORTH DAKOTA	SOUTH DAKOTA	EASTERN MONTANA
LOWER CRETACEOUS			→	———	Fosterton Cantuar Success North Premier Java	Renville gas (shut in)	———	———
JURASSIC			→	———	Fosterton Midway Cantuar Eastend Wapella Frontier Gull Lake Rapdan Loomis Leon Lake Dollard	———	———	———
TRIASSIC	Spearfish		→	———	———	Fryburg South Westhope	———	———
PERMIAN	NO PRODUCTION IN BASIN FROM PERMIAN							
PENNSYLVANIAN				NO PRODUCTION IN BASIN FROM PENNSYLVANIAN				
MISSISSIPPIAN	Big Snowy Gp. Heath		→			Rocky Ridge Belfield Scoria Fryburg Dickinson		
	Madison Gp. Charles		→		Midale	Bottineau County		Poplar
		Mission Canyon	→	Waskada Coulter	Ratcliffe Forget Midale Moose Frobisher (others)	Nesson anticline Bottineau County Newburg Scoria Bluell Dickinson Columbus Fryburg Coteau Flaxton Lignite Area Noonan Antelope	———	Richey Wolf Point
		Lodgepole	→	Daly Virden-Roselea Tilston Lulu Lake Whitewater	———	Bottineau County	———	———
		Bakken (Sanish sand)	→	———	———	Sanish Antelope	———	———
DEVONIAN	Three Forks		→	———	———	Beaver Lodge	———	Southwest Richey Outlook
SILURIAN	Interlake		→	———	———	Beaver Lodge	———	Outlook Amerada 1 Sand Creek Shelvik Southwest Richey North Richey
ORDOVICIAN	Red River		→	Hummingbird Disc.	———	Beaver Lodge Kerr-McGee 1 Johnson	Buffalo	Outlook Brorson Cedar Creek anticline fields

HERE IS A FORMATION-FIELD-AREA CORRELATOR of the Williston basin. Oil and gas production is found in rocks from Ordovician through Lower Cretaceous. The Mississippian Madison group is the basin's biggest producer. The two newest big producers are the Silurian and Ordovician in northeastern Montana's Outlook area.

GENERALIZED COLUMNAR SECTION shows the numerous potential pay zones in the Williston basin. The importance of the pre-Madison production becomes more apparent daily. Fig. 4.

Nelson. This well (Fig. 2) tested 671 ft. of productive interval through perforations. And the entire 671 ft. lay below the Madison limestone.

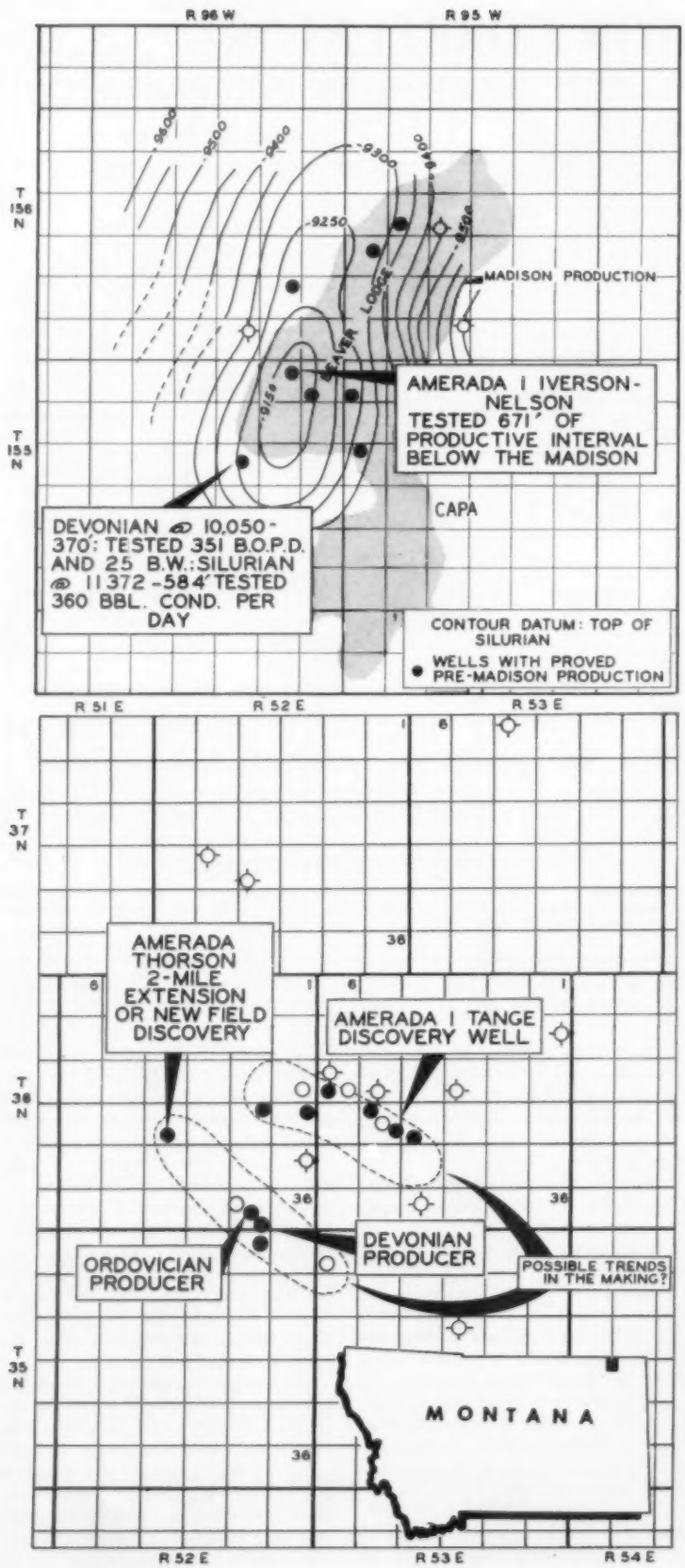
- Two zones in the Duperow-Devonian were productive with tests as high as 340 bbl. of oil per day.
- The Silurian had 257 ft. of possible pay, although only the upper 85 ft. was water free.
- The Ordovician Red River tested for 400 bbl. of oil per day from a 74-ft. perforated interval along with 9,000,000 cu. ft. of gas per day. The Red River production was 54.2°-gravity oil.
- Deepest zone tested in the 1 Iverson-Nelson was the Winnipeg-Ordovician. This zone, however, yielded only gas on drill-stem test.

There is little question of a Silurian structure in the Beaver Lodge area. Already there is sufficient subsurface control to map a closure that is even larger than the Mississippian structure (Fig. 5). Present data indicate that the Silurian producing area at Beaver Lodge will be as large if not larger than the Madison.

Undoubtedly many of the present Mississippian structures overlie deeper and possibly even larger Silurian producing areas. For a long time it was thought that even the shallow Cretaceous surface anticlines were not present at depth in the Williston basin. This myth has long since been exploded, and beyond a shadow of a doubt the Mississippian structures reflect deep-seated Silurian and Ordovician closures. These in turn could well reflect basement uplift or faulting, since magnetic work delineates most of the large structures in the basin.

Reserves . . . It is too early yet to guess what the deep reserves will be. Present data indicate that the Devonian at Beaver Lodge has better permeability than the Madison limestone and that the zone should have a water drive. Spacing pattern temporarily is 160 acres for the Devonian oil wells and 320 acres for the Silurian.

Unlike the Madison, it appears that the Silurian reservoir will produce condensate rather than crude oil. Within the reservoir, this exists as a gas and becomes a liquid when it reaches the surface. A gas-cycling plant will be required to strip the liquid hydrocarbons from the gas and return the gas to reservoir. Under this arrangement, engineers anticipate recovering as high as 90 per cent of the total liquids in the reservoir. If operators fail to inaugurate this program and produce the field in normal fashion, the ultimate recovery would probably only be 25 or 30 per cent of the total liquids.



THE SILURIAN structure at Beaver Lodge has over 450 ft. of relief and reflects the overlying Madison structure. Fig. 5.

Pay Zones

The Williston basin is rapidly emerging from a one-shot Madison proposition on drilling prospects to a multipay area. At the present time at least 13 pay zones have been proved productive (Fig. 4).

Cretaceous . . . Although not an important commercial producer, the Pierre produces dry gas along the Cedar Creek anticline. Several sandstones are present in the Cretaceous and are potentially productive. The Muddy already produces at Fosterton and several other fields.

Jurassic . . . The Morrison, although not yet productive within the Williston basin, is a pay zone in many parts of the Rocky Mountains. Within the Williston basin, both the Sundance and Piper limestones produce, although they are not considered primary drilling objectives.

Mississippian . . . Geologists break the Mississippian down into the Big Snowy and the Madison groups. Within the Big Snowy the principal pay zone is the Heath. It produces at Fryburg and Belfield.

Principal drilling target to date within the Williston basin has been the Madison. Until recently most of this production occurred at drilling depths of 8,000 to 9,000 ft., principally along the Nesson anticline. More recently Madison production in Burke County has been found in the Lignite area at 6,000 ft.

Actually the Madison is divided into four formations: the Charles, the Mission Canyon, Lodgepole, and Bakken. And all of these formations produce at least locally in the Williston basin (Fig. 3).

Along the Nesson anticline, the Madison is a prolific resorvoir and it accounts for nearly all of the oil production within the State of North Dakota. The Nesson anticline Madison fields will ultimately produce in excess of 250 million barrels of primary oil or approximately 5,500 bbl. per acre.

Pay thicknesses of the Madison vary considerably. In the southern end of the Nesson anticline, the gross pay section reaches 400 plus ft. in Blue Buttes field. At Charlson, too, the Madison has a gross pay thickness of

OUTLOOK in Sheridan County, Montana, has accentuated the importance of Silurian production along the Montana-North Dakota boundary. Fig. 6.

"Dry holes . . . are now long forgotten"

400 ft. One of the best fields discovered to date is Antelope field (Fig. 3) where the discovery well logged some 300 ft. of Madison pay.

Shallow Mississippian production . . . Geologists have long expected that the shallow Mississippian production in Manitoba and Saskatchewan would eventually spill over into North Dakota, and within the past 2 years these hopes have been realized. In Renville and Bottineau counties, several shallow Mississippian fields have been uncovered, and this area held the spotlight along the border until the recent significant strikes in Burke County. Key areas now are Noonan and Lignite. At Lignite, Mississippian production is found at drilling depths of 6,000 ft. Geologic conditions are very similar to those just over the international boundary in Saskatchewan. Production apparently is related to both structure and stratigraphy, depending to a large measure upon the particular producing zone.

Montana . . . The Outlook area, discovered in December 1956, has rapidly mushroomed into a significant oil strike. The discovery well, Amerada 1 Tange, found Silurian production between 9,056 and 9,074 ft. Subsequently Amerada's 1 Loucks established Ordovician production (Red River) between 9,896 and 9,916 ft. (Fig. 6).

Devonian pay was first productive in the Amerada 1 Patchin. This well had 115 ft. of productive interval and had an initial potential of 250 bbl. of oil per day with 19 bbl. of water. Tentatively its age has been called Winnipegosis (Lower Devonian).

The three pay zones in the Outlook area shed new light on the oil potential of this part of the Williston basin. Almost certainly the Outlook production will trigger a deep exploration program aimed at finding pre-Madison oil in the western portion of the basin. Outlook is only a few miles south of the Canadian border and Imperial has apparently established Ordovician production at its 1 Hummingbird, 25 miles northeast of Outlook in Saskatchewan.

Cedar Creek anticline . . . Shallow gas production on a known surface trend was the tipoff to deep oil production along the Cedar Creek structure first uncovered in 1952. Now a chain of oil fields extends from Deer Creek on the north to Little Beaver on the south, a distance of 90 miles (Fig. 1).

Pine field is typical of the many oil fields along the Cedar Creek anticline. Discovery well was located on a subsurface seismic closure near the crest of the known surface anticline. It was completed in January 1952 on the pump for 467 bbl. of oil and 148 bbl. of water from the Stony Mountain formation of Upper Ordovician age. Better Ordovician production was established by later wells, and also Silurian production.

At Pine, structure is important, but stratigraphy, too, plays a key role. There is at least 200 ft. of closure in the field at Ordovician level.

Pine, like so many Williston basin fields, is developed on 80-acre spacing. Pay zone occurs at drilling depths of 9,400-9,800 ft., depending upon the producing zone and structural location. Unofficial estimates place the ultimate recovery at 5,000 bbl. per acre.

A look ahead . . . The rash of dry holes that characterized Williston basin wildcat drilling during the lean years of 1954, 1955, and 1956 are now long forgotten. Oil finders point to 1957 as a banner year. Today the targets in the Williston basin are many, and it is still a young oil province. There seems little question that the basin, with its recent wave of deep discoveries, is in the same position that West Texas occupied in 1927 when Big Lake was uncovered. Exploration is fanning out in all directions from the sprawling and prolific Nesson anticline fields that now extend nearly 60 miles in a north-south direction.

South Dakota is dragging its feet in the race to find more oil reserves for the Williston basin. The 1957 record was rather discouraging, 45 wildcats drilled and 44 dry holes. But it, too, should eventually become an important oil-producing state. It has all the necessary qualifications, a thick marine section lying within a sedimentary basin.

In North Dakota, the oil possibilities appear to be virtually unlimited. The area looked good with only the Madison as a primary drilling target. But now with at least 13 separate pay zones, North Dakota and the Williston basin stand alone as a top new oil province. Oil companies that rushed in during the early days and then withdrew are now trying to re-establish themselves in the basin. With rewards such as 671 ft. of pre-Mississippian pay to shoot at, oil finders wax enthusiastic over the future of Williston.

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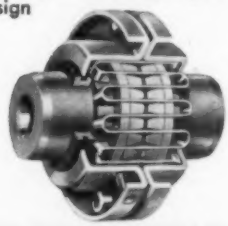

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NOSLA meeting to feature panel show

SPEAKERS for the annual June meeting of the National Oil Scouts and Landmen's Association to be held this year in Tulsa, were announced by George Echols, Standard Oil of Texas, Tyler, who is president of the association.

A 2-hour panel show will be presented by Kenneth B. Barnes, Dr. Frank J. Gardner, and G. L. Farrar, all editors for The Oil and Gas Journal, and Dr. Oscar B. Irizzarry, editor of Petroleo Interamericano, affiliate of the Journal covering Latin American oil operations.

Echols said the speeches and the panel will require a full day in presentation, and will be given at the Crystal ball room of the Mayo Hotel, June 6.

Geologists receive awards from AAPG

GRAHAM B. MOODY, president of the American Association of Petroleum Geologists, announces the following recipients of honorary awards formally presented Tuesday, March 11, at the forty-third annual meeting of the association in Los Angeles.

Paul Weaver, professor of geology, Texas A. & M. College, Houston, received the Sidney Powers Memorial Medal in recognition of his outstanding contributions to petroleum geology. The presentation was made by Roy R. Morse, consulting geologist of Houston.

As a symbol of distinguished services performed in the field of petroleum geology, certificates of honorary membership were presented to Carroll Edward Dobbin, regional geologist, USGS, Denver, by J. V. Howell, consulting geologist of Tulsa; K. C. Heald, petroleum consultant, Fort Worth, by M. G. Gulley, Gulf Oil Corp., Pittsburgh; William B. Heroy, president, Geotechnical Corp., Dallas, by A. Rodger Denison, Amerada Petroleum Corp., Tulsa; A. I. Levorsen, consultant, Tulsa, by Paul E. Fitzgerald, Dowell Incorporated, Tulsa; Raymond C. Moore, principal state geologist, Lawrence, Kans., by K. K. Landes, University of Michigan, Ann Arbor, Mich.; and Wallace E. Pratt, consulting geologist, Carlsbad, N. M., by L. T. Barrow, Humble Oil & Refining Co., Houston.

Second producer confirms Ohio pool

A SECOND producer confirms a new pool or extension of the Layland-Spring Mountain field into Section 3, Monroe Township, Coshocton County.

Cascade Oil Co. reported their 1 D. Miller, the first offset to Pattons' 1 G. Williams, as logging Clinton sand at 3,450-3,512 ft. with a 12-bbl. showing natural and 250 bbl. with 1,870 M.c.f. of gas in a 24-hour test after fracture. Four additional wells are drilling in the limited area.

This Wisconsin-Powered Trailer Unit produces Oil by AIR LIFT!

Of special value for pumping low production wells, where operating cost economics are of vital importance, Wisconsin Heavy-Duty Air-Cooled Engines are again proving their unique versatility, and load-lugging dependability.

As every oil field operator knows, newly drilled wells will sometimes have a low gas-oil ratio and subnormal rock pressure which will prevent oil from flowing. By injecting gas or air at the bottom of the hole at medium low pressure (depending on the depth and size of tubing), the oil will be lifted out of the bottom of the hole. At the same time this applied pressure loosens the sand and shale, thus creating a larger reservoir for accumulating oil.

Pictured above is a two-stage compressor unit with a capacity of 50 CFM, driven by a Model VH4D V-type 4-cylinder Wisconsin Air-Cooled Engine with clutch. This installation is operating at the La Vernia oil field near Seguin, Texas, on shallow wells (800 to 1200 ft.) with a low production of 2 to 4 bbls. per day. Well tubing is ¾", casing 2" and flow lines 1¼" . . . tailor-made for the job.

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A8-6135

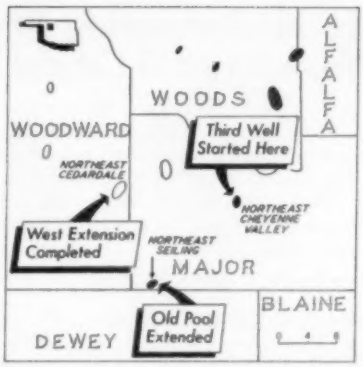
In Oklahoma . . .

New action in an old pool

WOODWARD and Major counties figured highly in northwestern Oklahoma exploratory news last week. Focal points of interest were old Northeast Seiling pool in Major County, new Northeast Cedardale pool in Woodward County, and Major County's new Northeast Cheyenne field.

At Seiling . . . Calvert Drilling Co. has revived drilling in old Northeast Seiling pool, southwestern Major County. The 1 Bensch, SW SE 27-20n-16w, flowed 10 M.M.c.f.d. of gas with distillate from perforations in the Chester-Mississippian at about 8,375 ft.

This well is the first activity in this field since its discovery several years ago. Northeast Seiling was one of the first pools in northwestern Oklahoma.



TWO IMPORTANT extensions and one new location highlighted the week's developments in northwestern Oklahoma's fast-moving Woodward play.

At Cedardale . . . Shell Oil Co. 1-22 Smith, C NE SW 22-22n-17w, Woodward County, is a 1-mile west extension discovery to new Northeast Cedardale pool.

The Mussellem sand-Pennsylvanian discovery flowed 3,500 M.c.f.d. of gas plus 15 bbl. of condensate per million from perforations at 6,409-14 ft.

At Cheyenne Valley . . . The third well in newly opened Northeast Cheyenne pool in Major County was announced last week. It is Gulf Oil Corp. 1 Sodowsky, C SE SE 32-22n-14w. The well will be drilled to 6,900 ft., west of the discovery well of the new pool. The 1 Kaufman, another Gulf well, is drilling east of the discovery well in C SE SW 33-22n-14w.

Wells Score Heavily In Oklahoma Panhandle

Prolific gas-condensate and oil wells were reported in the Oklahoma Panhandle. Shell Oil Co. completed 1-19 Moore in C SE NW 19-3n-28eCM, on the west side of booming Highland field in Beaver County, flowing 56 M.M.c.f.d. of gas and 2.7 bbl. of condensate per million from perforations in the Hoover-Pennsylvanian sand at 4,466-90 ft.

In the East Camrick area of southwestern Beaver County Lynn Drilling Co. finaled the 1 Ellis in NE NE SW 32-1n-20eCM, flowing 440 bbl. of oil per day on ½-in. choke. Production is from regular field pay, the Morrow sand, at 7,268-92 ft.

In South Glenwood field in northeastern Beaver County Monsanto Chemical Co. 1 Everett-State, SE SE NW 3-5n-27eCM, flowed 2,530 M.c.f.d. of gas on a 7-hour test of perforations at 6,243-48 ft. in the Morrow. Flow was through 20/64-in. choke.

Send for this informative new bulletin today!

Cook Bulletin No. 700, *"Non-Metallic Laminated Valve Plates"* is now off the press. It contains up-to-date facts on the when, why and where of non-metallic valve plates—plus helpful data on applications, delivery and special materials. It also explains how Cook laminated valve plates are different from competitive brands, and *why* they are better.

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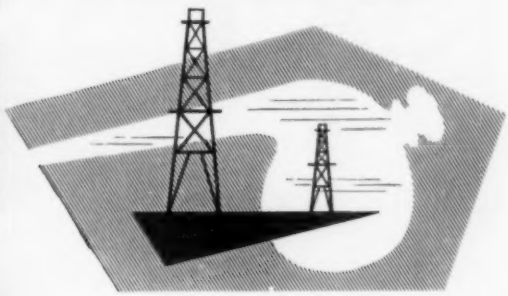

An outstanding development in British industry in the last twenty years has been the expansion of the Petroleum refining and Chemical Industries. The Chemical and Petroleum Engineering Exhibition—the first of its kind—will present dramatic evidence of the tremendous achievements that have been made.

At Stand after Stand, contractors, designers and specialists in every branch of British chemical and petroleum engineering will have something to show of vital interest.

The Exhibition will also include a conference on "The Organisation of Chemical Engineering Projects" arranged by The Institution of Chemical Engineers and The Institute of Petroleum; and films will show how the Chemical Plant and Petroleum Equipment Industries have helped in the development of their consumer industries.

A visit to this Exhibition is a MUST to all concerned in chemical and petroleum projects and to everyone whose industry is in any way influenced by such projects.

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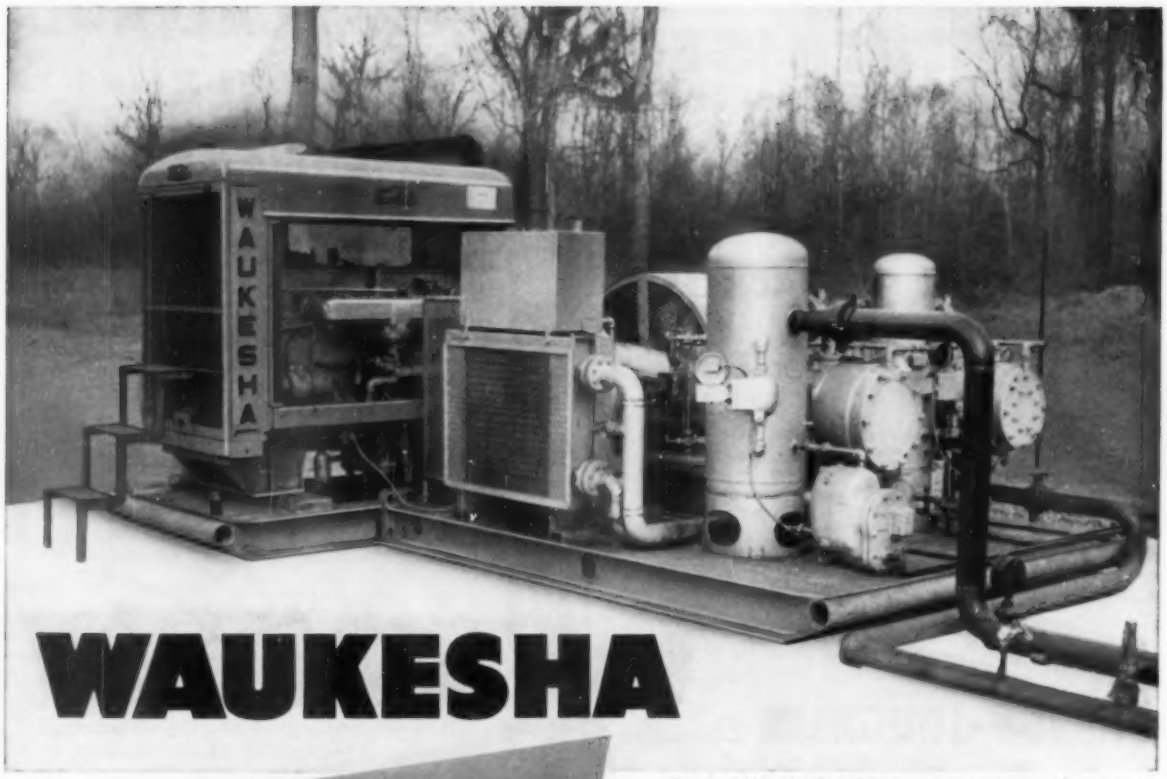

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140-GZB	4⅜ x 5½	554	No radiator or fan	142 @	44	....	55	....	65	75	84	92
			With radiator, fan	1800	43	....	53	....	62	71	79	85
145-GZB	5⅜ x 6	817	No radiator or fan	214 @	65	....	81	....	96	110	125	139
			With radiator, fan	1800	62	....	77	....	90	103	116	129
WAKB	6¼ x 6½	1197	No radiator or fan	260 @	85	....	110	....	134	153	169	
			With radiator, fan	1600	82	....	106	....	127	144	157	
NKRB	7 x 8½	1905	No radiator or fan	335 @	155	170	187	203	218			
			With radiator, fan	1200	149	163	176	189	199			
LRORB	8½ x 8½	2894	No radiator or fan	465 @	228	250	268	283	302			
			With radiator, fan	1200	221	242	257	271	286			
LRZB	9⅜ x 8½	3520	No radiator or fan	568 @	273	304	330	351	369			
			With radiator, fan	1200	265	294	316	332	343			
VLROB	8½ x 8½	5768	No radiator or fan	890 @	435	481	524	557	579			
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North Carter Heads For New-Pay Discovery

Western Oklahoma's new North Carter field, one of the 1957 exploratory highlights, appears headed for a new-pay discovery. Shell Oil Co. 1 Millard Patten, SW SW SE 9-9n-22w, third well in the Beckham County field, tested gas in the granite wash at 8,168-8,210 ft.

The original discovery well, 1 Boyd, was a Springer discovery of considerable significance last year. That well moved Springer-Pennsylvanian oil to its westernmost point in the Anadarko basin. The confirmation well failed to hit the Springer pay, but was completed a few weeks ago in the Des Moines-Pennsylvanian.

New Pool Find Is Fourth For Ellis

Ellis County in northwestern Oklahoma has four producing areas as a result of Pan American Petroleum Corp.'s success at its 1 Schoenhals in C SE NW 23-20n-25w, 4 miles northwest of Arnett.

The gas-distillate discovery flowed open flow 5,720 M.c.f.d. of gas and distillate from Morrow-Pennsylvanian perforations at 10,745, 10,746, and 10,747 ft.

This is the third new pool in Ellis County in the past few months, all of them Pan American discoveries.

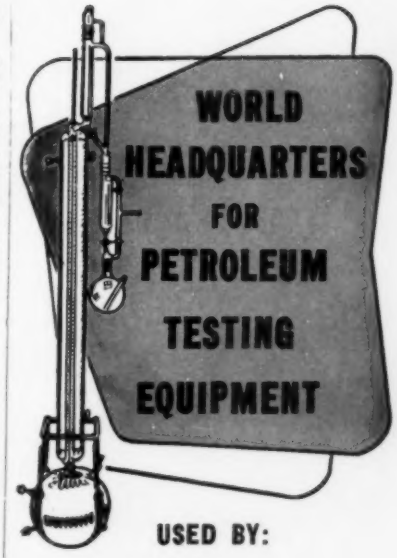
Northeast Catesby in the northwest corner of the county has six producers; two other unnamed fields were opened in the northeast corner of the county, and east of the city of Gage. South Salon field, the county's first producer of several years ago, is inactive.

Kentucky's Breathitt activity quickens

IN WESTERN Breathitt County, about 5 miles west of Jackson, the county seat, considerable activity is taking place following the completion of the Creech 1 Gabbard as a 125-bbl. per day producer from the Corniferous lime topped at 1,736 ft. and bottomed at 1,786 ft.

Drilling is located mainly on Puncheon Camp Creek where 10 rigs are busy exploiting this new field. Petroleum Exploration is in the process of completing 1 Gabbard Heirs, a 1,700-ft. north extension to the discovery.

Early tests indicate production may be in excess of 100 bbl. daily.



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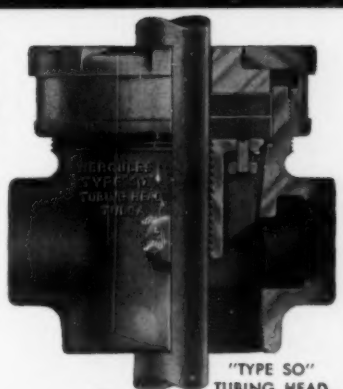
HERCULES "Type SO" Tubing Head is particularly suited for pumping due to compactness (only 12½" high). Stripper rubber can be used in body for running or wiping tubing. Also ideal for intermittently flowing wells.



"TYPE SO" TUBING HEAD

HERCULES "Type SO" and "SOS" Tubing Heads are the favorite of successful operators because of their simplicity, ruggedness and ease of operation. Available in 4½" OD to 7" OD Casing Sizes to suspend 2", 2½" or 3" tubing. Constructed from pressure cast steel and tested to 4,000 PSI. Slips are hinged for ease of installation and positive alignment.

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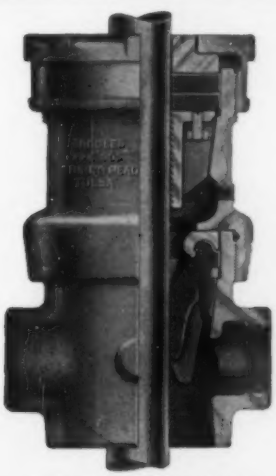

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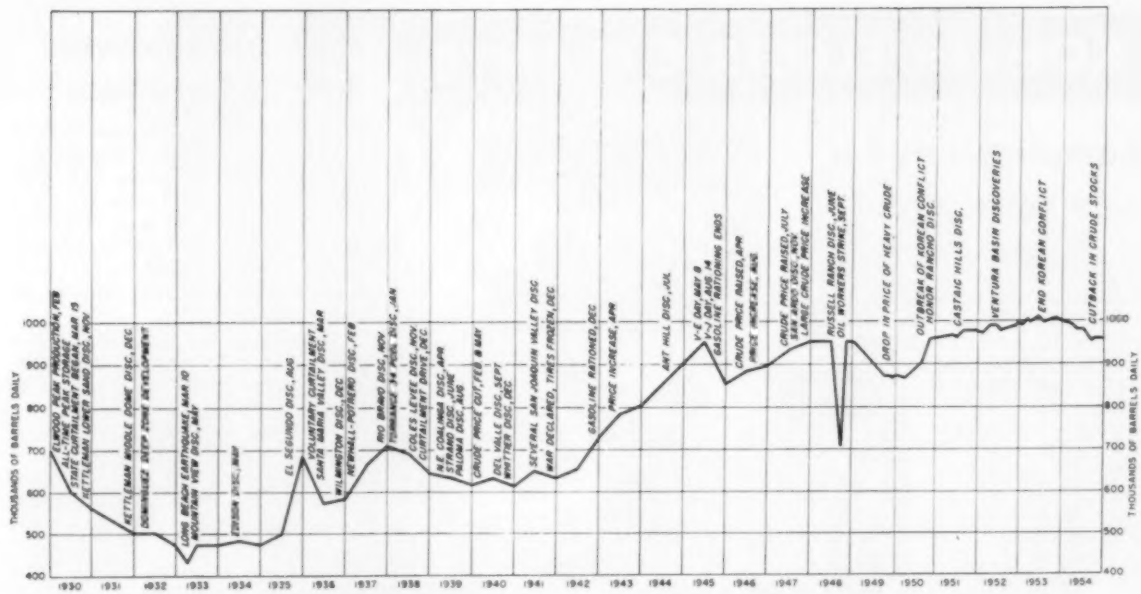

CRUDE-OIL PRODUCTION from 1930 to 1954 with events that influenced production.

New book gives California oil picture

The State of California Department of Natural Resources, Division of Mines, has released Bulletin 176, "Mineral Commodities of California." The new book deals with the geologic occurrence, economic development, and utilization of the state's mineral resources. Of special interest is the chapter on petroleum.

The petroleum section of the bulletin, by Charles W. Jennings, discusses the geologic occurrence of oil in California, areas where oil is found, early history of exploration and development in the state, highlights of exploration, the future of oil hunting in the state, oil production, prices, reserves, and utilization.

This oil section of the bulletin is well illustrated with charts and maps. One table shows the production of oil in California by geologic ages. There are seven Pleistocene pools, 149 Pliocene, 405 Miocene, 37 Oligocene, 19 Eocene, 3 Cretaceous, 3 Precambrian (or basement), and 7 unclassified oil producing areas in the state. Total number of oil fields in the state is 650.

A map of California shows the major rock units and their significance to exploration for oil and gas. This is followed by a summary of geology and production of oil fields in the state in tabular form.

Of particular interest is a chart showing crude-oil production in California from 1930-1954, and historical events that influenced production.

The new bulletin was prepared under the direction of Olaf P. Jenkins and edited by Lauren A. Wright. Price is $7.50. Bulletin 176, dated 1957, may be obtained from the Division of Mines of the California Department of Natural Resources, Ferry Building, San Francisco.

New 1958 revised . . .

U. S. POOL MAPS

Here are 17 completely up-to-date maps of the most active oil areas in the United States. Shows both oil and gas pools.

These maps are lithographed in three colors and give locations and names of both oil and gas fields.

Small scale—Journal page size—conveniently bound for ready reference in field or office. County and township lines make easy plotting of new wildcat locations.

Areas Covered: 1) California, 2) Intermontane Basins, 3) Northern Wyoming, 4) Williston Basin, 5) Kansas, 6) Julesburg Basin, 6a) Four Corners Area, 7) Hugoton Area, 8) Oklahoma, 9) North and East Texas, 10) Permian Basin, 11) West Gulf Coast, 12) South Texas, 13) East Gulf Coast, 14) Miss.-La.-Ark., 15) Tri-State Area, 16) Michigan.

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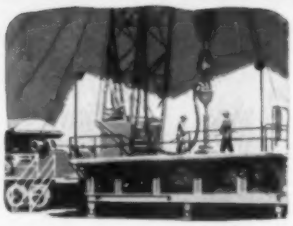

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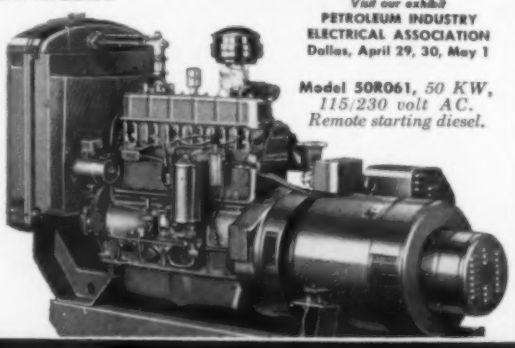

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Arkansas uncovers new gas producer

New exploration in northwestern Arkansas has uncovered another gas-productive area. Discovery well, drilled by Stephens Production Co., is 3 miles northeast of Hartman, and about 4½ miles west of Clarksville, in Johnson County. It is about 3 miles southwest of Clarksville field, another recent gas discovery.

Stephens' discovery well, 1 Ben Hardgrave, in 5-9n-24w, is productive from two sands, both in the Atoka section.

From the upper zone, the "Kelly" sand, perforated at 4,384-88 ft., 4,429-31 ft., and 4,433-43 ft., the well tested 1,949 M.c.f.d. of gas, flowing through ⅜-in. choke under pressure of 535 psi.

The lower zone, the "Cline" sand, perforated at 4,659-81 ft., the well flowed 7,915 M.c.f.d. through 15/32-in. choke under pressure of 1,300 psi.

Coastal well in Louisiana completed

Signal Oil & Gas Co. has completed its third high-pressure gas well in the South Lake Charles area of Calcasieu Parish, Louisiana Gulf Coast.

The well, 2 Lawton, is productive from perforated interval at 13,230-60 ft. During a 3-hour test through 9/64-in. choke, it flowed at the rate of 2,507 M.c.f.d. of gas, recovering 417 bbl. of 52.8°-gravity condensate.

Flowing pressure was 8,965 psi. Shut-in pressure is 9,063 psi.

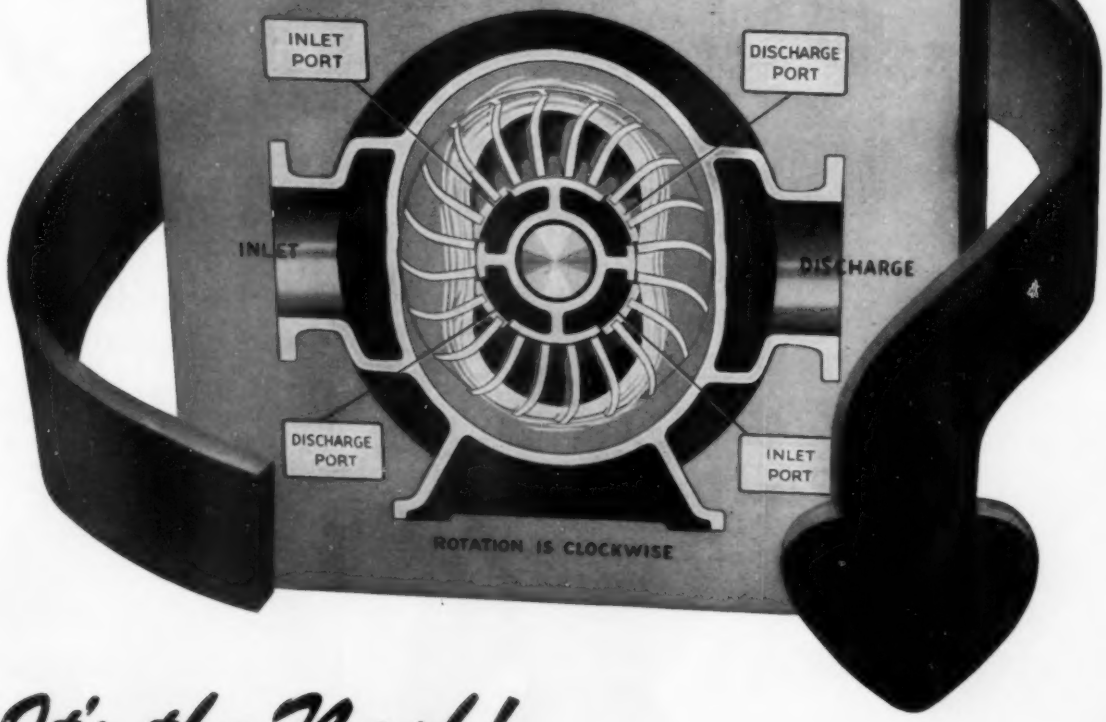
New Texas strike

Superior Oil Co. has a new oil discovery in its North Maude B. Traylor field, in the Point Comfort area, northeastern Calhoun County, in Texas' central coastal district.

The discovery is its 2 Maude B. Traylor, which flowed at the rate of 109 bbl. of 41.6°-gravity oil per day during a 4-hour test through 7/64-in. choke. Flow was with gas-oil ratio of 900 cu. ft. per barrel with pressure of 1,225 psi.

Production is from a 7,600-ft. Frio sand, perforated at 7,636-39 ft. Superior's previous wells in this area have been productive of gas-condensate from deeper sands, ranging from 9,300 to below 10,600 ft. Only other oil production in the area is a small well completed by Southern Minerals Corp. in a 7,400-ft. sand.

This is Why the Nash is the Most Simple Compressor



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There are no mechanical complications in a Nash Compressor. A single moving element, a round rotor, with shrouded blades, forming a series of buckets, revolves freely in an elliptical casing containing any low viscosity liquid. This liquid, carried with the rotor, follows the elliptical contour of the casing.

The moving liquid therefore recedes from the rotor buckets at the wide part of the ellipse, permitting the buckets to fill with gas from the stationary Inlet Ports. As the casing narrows, the liquid is forced back into the rotor buckets, compressing the gas, and delivering it through the fixed Outlet Ports.

Nash Compressors produce 75 lbs pressure in a single stage, with capacities to 6 million cu. ft. per day in a single structure. Since compression is secured by an entirely different principle, gas pumping problems difficult with ordinary pumps are often handled easily in a Nash.

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No internal wearing parts.

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Low maintenance cost.

Saves floor space.

Desired delivery temperature automatically maintained.

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75 pounds in a single stage.

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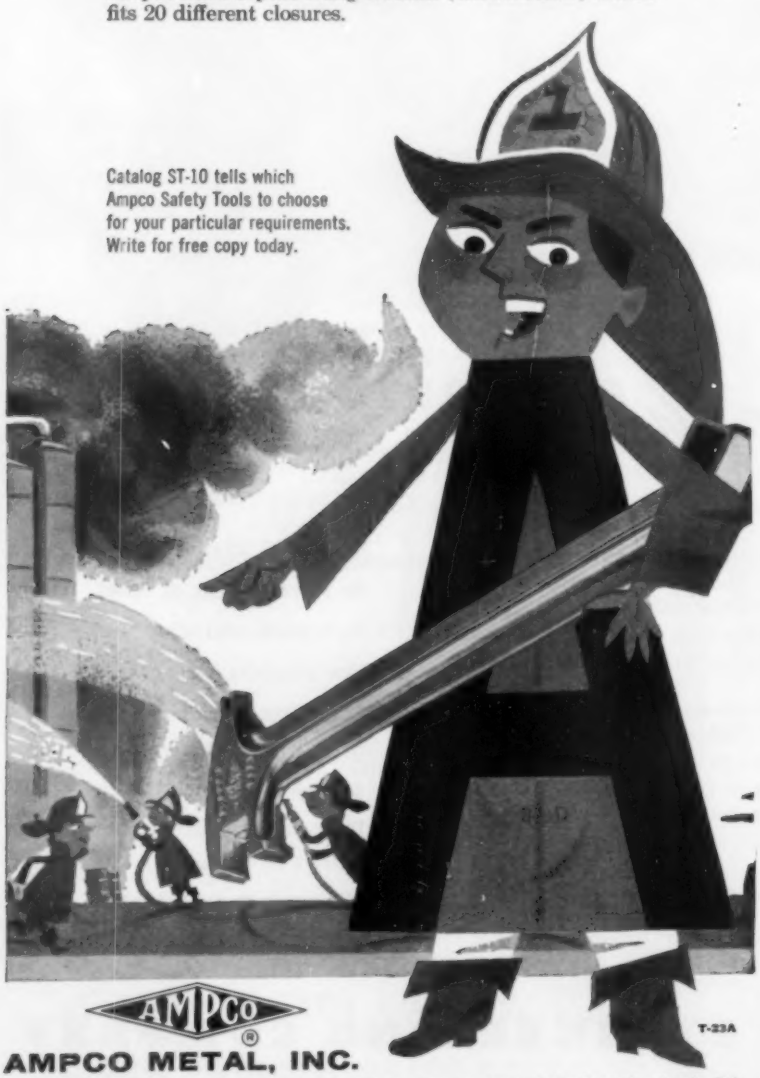
Catalog ST-10 tells which Ampco Safety Tools to choose for your particular requirements. Write for free copy today.



T-23A

AMPCO METAL, INC.

Dept. OGJ-3, Milwaukee 46, Wis. • West Coast Plant: Burbank, Calif. • In Canada: Safety Supply Co., Toronto, Ont.

A DEEP Permo-Penn gas discovery was reported in the Grande Prairie area of northwestern Alberta. The discovery well is Triad Oil Co. A-1 Big Mountain Creek.

Alberta finds deep gas well

THE DEEPEST Permo-Penn gas production in Alberta was opened at Triad Oil Co. A-1 Big Mountain Creek Crown, a Grande Prairie area wildcat in the northwestern part of the province, southeast of the Fort St. John area of British Columbia.

The well, 30 miles southwest of Grande Prairie, flowed up to 13 M.M.c.f.d. of gas from deep zones in the Permo-Penn at 10,444-10,504 ft.

Triad's discovery is an old hole reworked and deepened. The well was first drilled by Pan American Petroleum Corp. last year. It was suspended after finding some gas in the Gething zone.

Grande Prairie gas strikes add reserves

THE BRIGHT YELLOW, almost smokeless flame of burning raw natural gas shot skyward at two widely separated exploratory tests in the south Grande Prairie region of northwestern Alberta during the past couple of weeks.

The flares signified discovery of more gas reserves for the province of Alberta and added further weight for additional export of gas from Canada which is advocated by a majority of Canadian operators. Although the new discoveries were miles apart and recorded in different geological horizons, the same company, Triad Oil Co., Ltd., was operator in all cases.

Other similarities for the new gassers include the facts that all are on a contiguous acreage spread, in which Pan American Petroleum Corp. has a

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direct working interest, and a group of Canadian independents have a substantial net-carried stake.

The tests are not likely to be followed up immediately, for they are situated in the "muskeg" region of the province, an area that is readily accessible only during the "deep freeze" period in Canada. The operator will be fortunate to complete drilling operations at all wells this season for the string is running out with spring's thawing conditions just around the corner.

The discoveries were made at Triad-Pan American drilling team's Grovedale and Haglund. The Grovedale discovery well is being drilled on LSD 6, 8-68-8w6, 25 miles southwest of Grande Prairie town; Haglund on LSD 6, 25-66-13w5, is about 50 miles southwest of that northern Alberta center and 29 miles west-southwest of Grovedale.

At Grovedale No. 6-8, the most northeastern discovery, the Cadomin section was topped at 8,000 ft. The 60-ft. interval below 8,205 ft. gassed at maximum rate of 6½ M.M.c.f.d.

Haglund 6-25 picked up its discovery in the Cadotte zone when drillstem test of 50-ft. interval below 8,183 ft., flowed gas at 1,005 M.c.f.d. This gas pay section was topped at 8,170 ft. and K.B. elevation at wellsite is 3,231 ft. Haglund is also scheduled to test below 10,000 ft. and contractor, Gustavson Drilling Co. is heading on.

In addition to the two gas discovery wells that are being continued, Triad is drilling at another pair of wildcats on its large acreage spread. The other drillers include Hazelmere 6-16 situated in the northwest sector of the land block 45 miles west-southwest of Grande Prairie, and Chinook 6-15 in the extreme southeast corner of the spread 58 miles southwest of Grande Prairie.

The solid block held by Triad-Pan American and associates covers approximately 1,224 sq. miles in a rectangular block. The west boundary of the rights is the British Columbia border and the 24-mile-wide strip extends about 50 miles east into Alberta. Eight Alberta Petroleum and Natural Gas Reservations are included in the block, including Nos. 1755, 1763, 1775, 1776, 1778, 1784, 1785 and 1786.

Exploration activity within the area has resulted in one other gas discovery, recorded at the stanolind Chinook Ridge A-1 test, LSD 3, 12-65-13w6, and four exploratory dry holes. Exploration by other companies near the limits of the spread has also given encouraging results.

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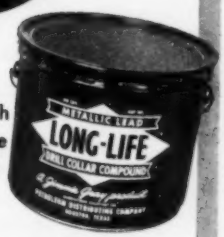

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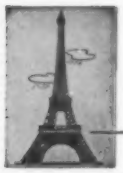

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A RECORD pay thickness of 196 ft. is reported at Hudson's Bay Oil & Gas Co. 9-10 Innisfail, field-development well in this booming South Central Alberta field.

Alberta's Innisfail hits record pay

ALBERTA'S fast-growing Innisfail field, 60 miles north of Calgary, added more laurels last week with the discovery of a record pay zone in the D3.

Innisfail is not yet 1 year old, but has 26 producing wells from the D3 zone. There are 10 rigs busy in the field which is about 60 miles north of Calgary. Productive area of the field is about 2,800 acres.

Wildcats drilling in lonesome country

THE THREE most remote wildcats in the North American Continent are drilling in Canada's Northwest Territories—one at Tetcho Lake, one at Trout River, and the other in the Tathlina Lake or Trapline region.

D. Todd Briggs, one of the larger acreage holders in the Northwest Territories, is drilling the three tests with Canadian Husky Oil, Ltd., handling contract. No drilling information is available as yet.

The three wildcats are: Briggs 1 Tetcho Lake, 112 miles southwest of Fort Providence, Briggs 1 Trout River, 20 miles north of the Tetcho Lake test, and the 1 Trapline, 42 miles

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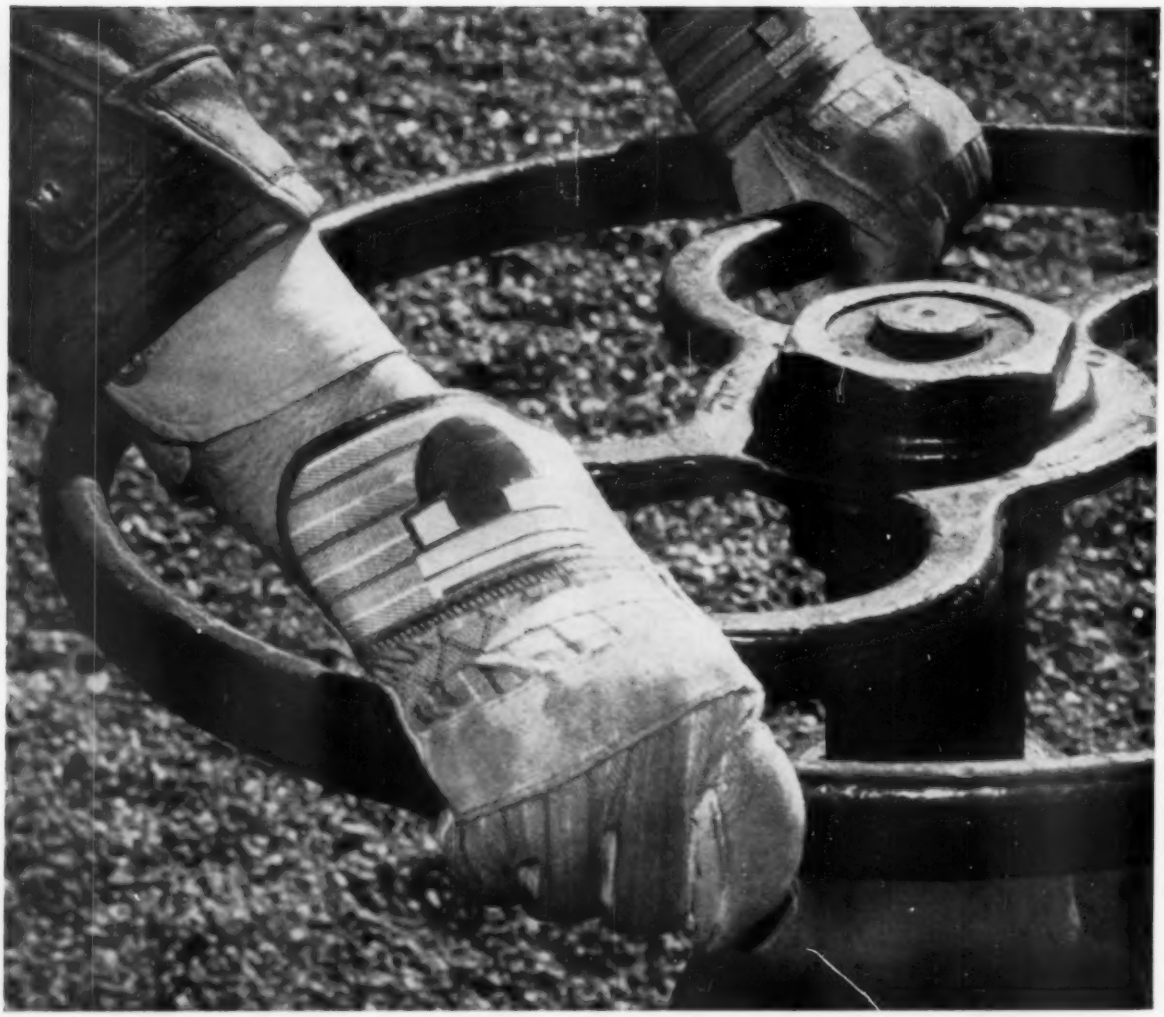

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south of Fort Providence in the Tathlina Lake region.

The Northwest Territories are a vast area of muskeg, rivers, and lakes. There are two producing areas in this huge region, one at Norman Wells (oil), the other at Rabbit Lake, a fairly recent gas-discovery area.

California's Tejon has prolific offset

RESERVE OIL & GAS CO. reported an excellent test of an offset to the most easterly producer in its recently discovered North Tejon field, Kern County.

The well flowed at a 614-bbl.-daily rate through a surface ⅛-in. choke on a test of the interval 11,807-28 ft. It flowed at a 1,018-bbl.-daily rate with a ¼-in. surface choke. A mud cushion of 3,210 ft. and a bottom-hole choke of ½-in. was used on the Johnson test.

This well is about ¼ mile southeast of the field discovery well. Reserve was drilling ahead to test other Vedder zone stringers below 12,000 ft. There are five known stringers, Z-1 through Z-5, with Z-4 being the best hope thus far.

California highlights . . . Credit E. A. Bender, operator, with a new sand discovery in the Canfield Ranch area of Kern County. Bender completed 47X-27 KCL in a main Stevens sand at 8,388-8,402 ft. The well flowed 100 bbl. daily of 33°-gravity crude through an 8/64-in. choke. It is located a little south and east of the old Canfield ranch area . . . Shell Oil Co. was running tubing in a 9,204 ft. wildcat in the Monroe Swell area of Monterey County. Shell plugged back the well to 8,800 ft. and ran 5½-in. casing to the bottom. The well is 1 Shell-Texas-Beedy . . . Flamingo Oil Co. was moving in heavier equipment to deepen its suspended 1 Flamingo wildcat in the Dead Mountain area of San Bernardino near the California-Nevada border. Present depth is 2,203 ft.

Carter well fills gap in Utah's Paradox

THE BARREN distance between White Mesa and McElmo Creek fields in Utah's Paradox basin was cut by 1 mile at Carter Oil Co. 2 Navajo-115, southwest outpost discovery in C NW NW 19-41s-25e, San Juan County.

The well that moves McElmo Creek field southwest flowed 456 bbl. of oil daily on ⅜-in. choke from perforations in the Paradox "B"-Pennsyl-

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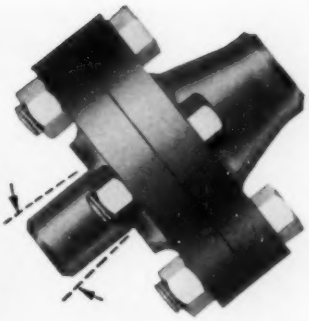

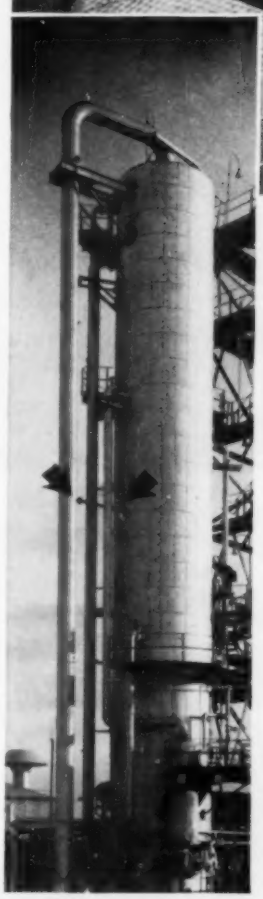

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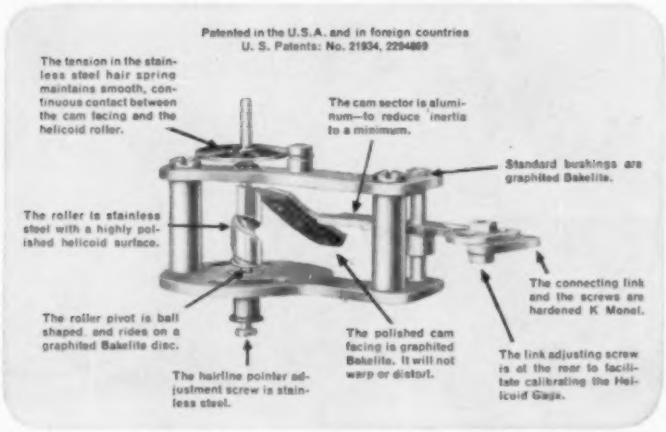
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vanian at 5,365-5,408 ft. This is the second extension discovery of 1958 in the Paradox basin—the first being Shell's westward extension of the Bluff Unit in February.

Utah's Big Flat Area Will See More Action

Utah's Big Flat area, first Mississippian producer in the state and northernmost production in the Paradox basin, will see more action.

Cabeen Exploration Corp. has announced location for the 1-A Big Flat Government in 31-26s-20e, Grand County, 3 miles southeast of Pure Oil Co.'s 1 Big Flat Mississippian discovery in SW SE 14-26s-19e. That important 1957 strike flowed 319 bbl. of oil per day from perforations at 7,694-7,728 ft., opening first Utah Mississippian production, and first Mississippian production in a huge area of the western Rockies. Closest similar oil is in Wyoming.

The new Cabeen location is 1 mile south of Pure 1 Hobson, a dry hole at 6,674 ft. Pure did not reach the Mississippian at this well. Cabeen will be drilling on a block of 2,740 acres, which is adjacent to the Big Flat Unit to the northwest.

Closest Mississippian drilling to the southeast from the new location is Midwest Exploration Co. 1 Shafer in SW NE 16-27s-20e, drilled in 1927.

The Midwest well ran about 380 ft. lower structurally on the top of the Mississippian than Pure's discovery. Radical differences in depth to the Mississippian in this area are due to topographic relief in the canyon of the Colorado River.

Successful Wildcats

TEXAS GULF COAST

Bee County: C. G. Glasscock et at 1 Goree, Thomas B. Barton Sur. (3 miles west of Mineral). IP 119 BOPD, 7/64-in., 38°, GOR 1,436 cu. ft. per barrel, TP 1,460 psi., perforations 7,173-75 ft. (Wilcox-Luling). TD 7,515 ft. (New field discovery.)

OKLAHOMA

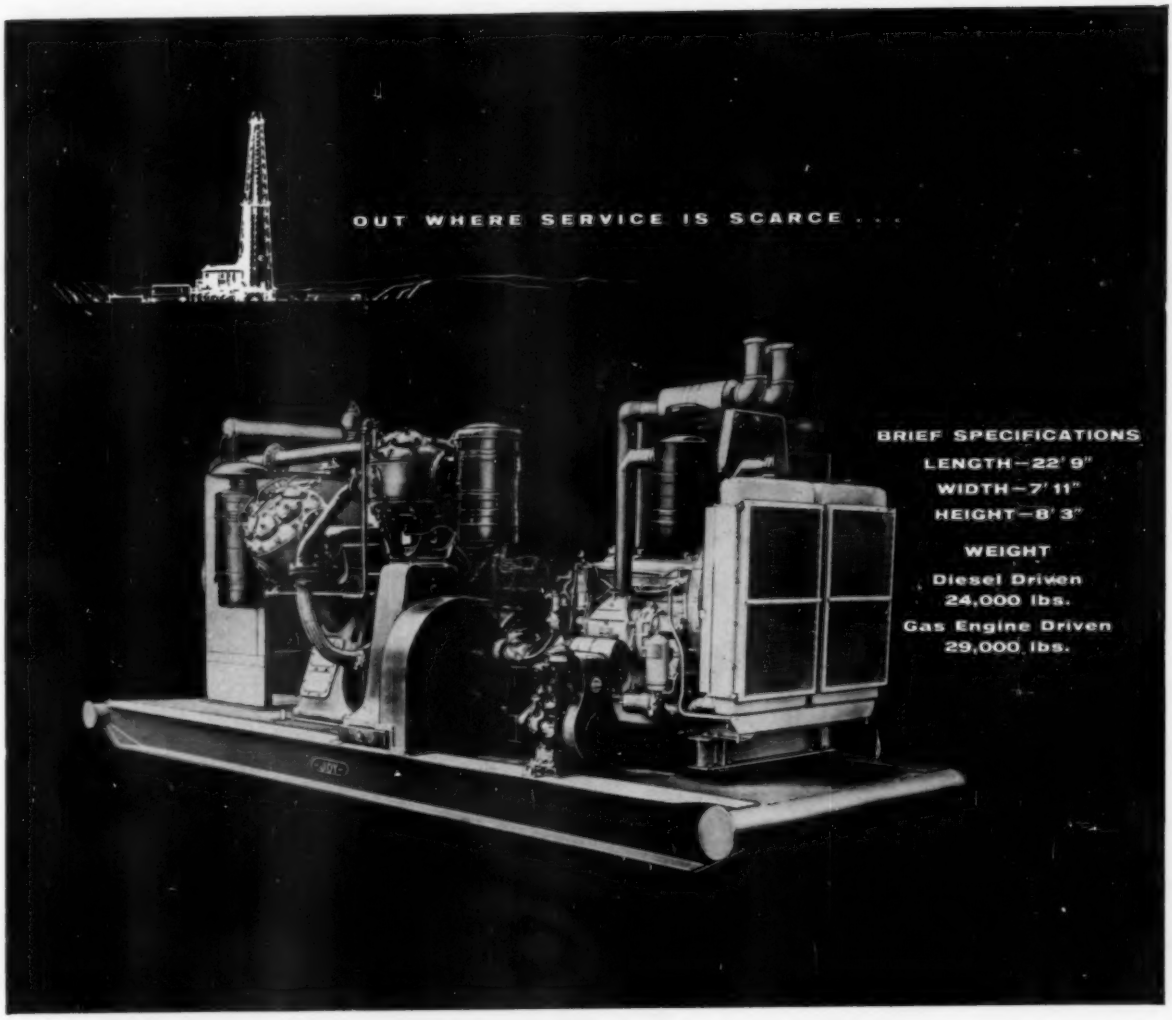
Alfalfa County: Gulf and Dudley & Heath 1 State, NE SW 16-28n-10w. Red Fork sand 4,914-26 ft. IP 2,270 M.c.f. of gas per day. TD 5,026 ft.

Beaver County: Gulf Oil Corp. et al 1 Jordan, C SW SW 12-4n-20eCM. IP 390 M.c.f. of gas per day, Herington 2,565-2,636 ft. TD 7,075 ft. New field.

Monsanto Chemical Co. 1 Dillon, C NW NE 13-6n-26eCM. IP 8,000 M.c.f. of gas per day, Mississippian 6,274-96 ft. TD 6,640 ft. New field.

Beckham County: Shadid Production Co. 1 Vitosky, C NE NE SW 27-8n-22w. IP 700 M.c.f. of gas per day, conglomerate 1,462-80 ft. TD 1,605 ft.

Coal County: Cooperative Refinery Association 1 McGee "B" Unit, SW NW 33-3n-9e. IP 121 BOPD, 39°, Cromwell 5,445-55 ft. TD 7,016 ft.



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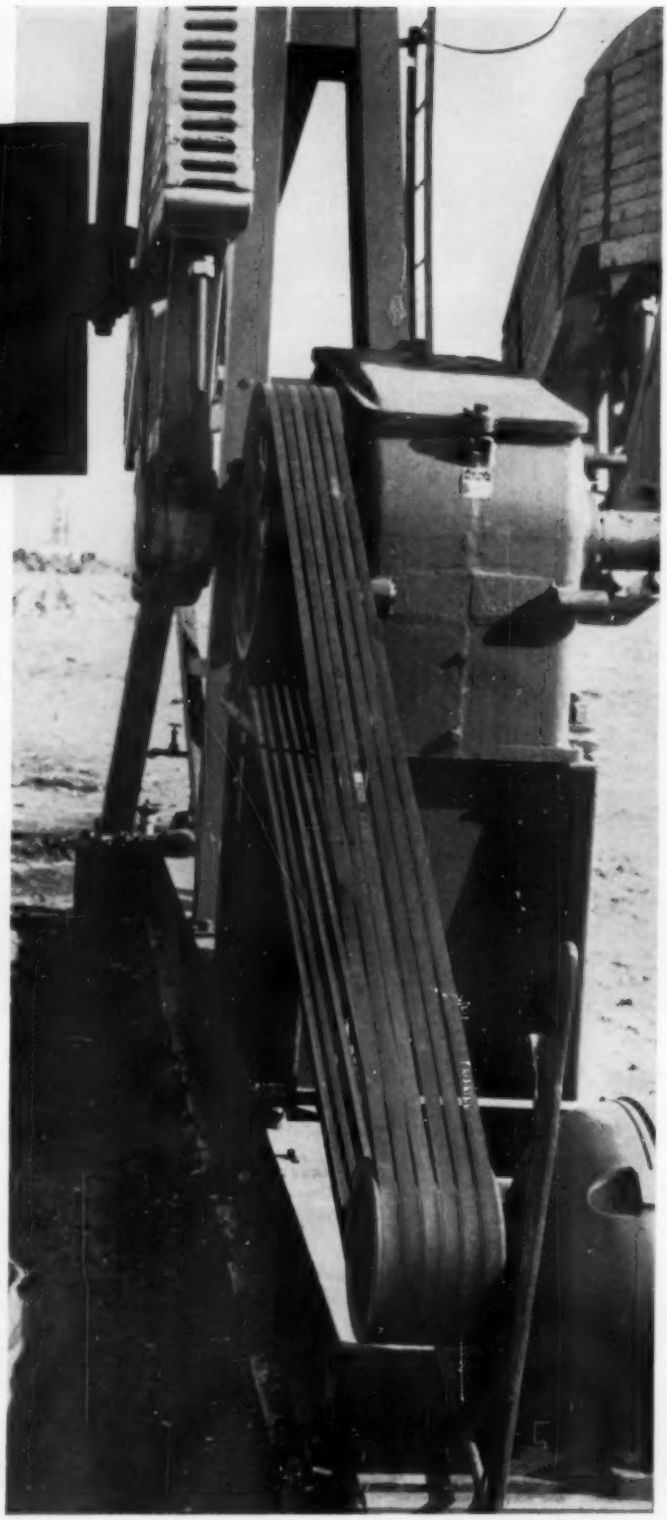

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Grant County: Woods Petroleum 1 City of Medford, NE SW NW 21-27n-5w. 750 M.c.f. of gas per day, Cherokee sand 4,840-76½ ft. TD 4,972 ft. Medford gas pool discovery.

Anderson Petroleum Co. 1 Michael, SW NE 34-27n-3w. IP 120 BOPD, 41°, Cherokee sand 4,264-84 ft. TD 4,685 ft.

Harper County: Pan American Petroleum Corp. 1-A Parker Unit, NW¼ 26-26n-21w. IP 530 M.c.f. of gas per day, Chester 6,352-54 ft., 6, 371-75 ft., 6,401-06 ft., 6,420-22, 6,432-34 ft., 6,443-46 ft. TD 7,751 ft.

Monsanto Chemical Co. 1 Doby, NE SE NW 1-27n-24w. IP 54,000 M.c.f. of gas per day, Morrow sand 6,142-47 ft. TD 6,645 ft.

Major County: Pan American Petroleum Corp. 1 Harris, N½ NE SW 13-22n-16w. IP 14,245 M.c.f. of gas per day, Cottage Grove sand 6,209-29 ft. TD 9,356 ft.

Huber 1 Phillips, SW SW 33-22n-14w. IP 630 BOPD, 40.5°, Cherokee sand 6,879-6,912 ft. TD 7,250 ft.

Marshall County: Blackwell Zinc Co. 1 Underhill, C NW NE NW NW 5-6s-6e. IP 264 BOPD, 39°, Woodford 2,428 2,628 ft. TD 2,747 ft. Woodward zone discovery.

Osage County: Producers Pipe & Supply Co. 1 Pitts, NW NW NW 19-27n-8e. IP 46 BOPD, 23 BWPD, 40°, Burbank 2,440-50 ft. TD 2,594 ft. New pay in Pearsonia pool.

Warren Bradshaw and G. W. Martin 1 Osage, NE NE SW 32-21n-10e. IP 49 BOPD, 36°, Bartlesville 2,075-81 ft. TD 2,081 ft.

Payne County: George W. Deck, Jr., 1 Richard Hawk, NW NW NE 32-18n-6e. IP 272 BOPD, 40°, Skinner sand 3,026-34 ft. TD 3,417 ft.

J. W. Nichols Exploration Co., Ltd., 1 Greiner, SE NW SE 13-19n-1e. IP 14 BOPD, 18 BWPD, 38°, Red Fork sand 4,325-40 ft. TD 4,456 ft.

Pottawatomie County: Powell Briscoe 1 Coleman, SW SE SE 12-7n-2e. IP 97 BOPD, 47 BWPD, 38°, dolomite 5,326-50 ft. TD 5,555 ft.

Texas County: Excelsior Oil Corp. 1 Dencker, C SW SW 8-4n-10eCM. IP 5,400 M.c.f. of gas per day, Topeka 3,134-58 ft. TD 4,980 ft. New gas field.

Panhandle Eastern Pipe Line Co. O-2 Easterwood, 11-4n-13eCM. IP 240 BOPD, Morrow 6,409-13 ft. TD 6,575 ft. New field.

Panhandle O-1 Reiss, C NW NW 11-5n-10eCM. IP 648 BOPD, 36.8°, Morrow 4,456-70 ft. TD 4,870 ft. New field.

KANSAS

Graham County: Jones-Shelburne & Farmer 1 Waltz, SW NW NE 25-8s-25w. IP 78.4 BOPD, 39°, Lansing 3,831-36 ft. TD 3,900 ft. Owens Northwest Holley pool.

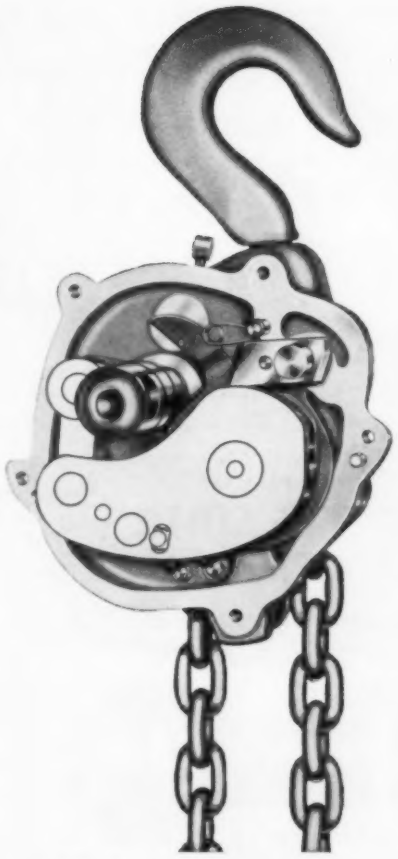
John P. Jennings 1 Kenyon, NE SE SE 5-8s-21w. IP 26 BOPD, 3% water, 28°, Lansing 3,360-64 ft. TD 3,620 ft. Opens Kenyon pool.

Imperial Oil Co. of Kansas 1 Knoll "A," NW NW SW 4-9s-25w. IP 27 BOPD, 1% water, 23°, Lansing 3,875-79 ft., 3,907-21 ft. TD 4,080 ft. Opens Knoll pool.

Murfin-Rains-Williamson 1 Beckett, SW SW NE 11-9s-23w. IP 200 BOPD, 41°, 3,790-93 ft., 3,776-81 ft. Lansing. TD 3,860 ft. Opens Southwest Mildrexter pool.

Empire and NCRA 2 Knoll, S½ SE NE 16-10s-25w. IP 240 BOPD, Toronto 3,770-78 ft. TD 3,992 ft. New pay in Elrick pool.

Ellis County: Alpine Oil & Royalty Co. 1



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DUFF-NORTON JACKS
Ratchet, Screw,
Hydraulic, Worm Gear

Gottschalk, NE NW SE 36-35s-18w. IP 49 BOPD, 38°, Lansing 3,244-51 ft. TD 3,440 ft. Opens Gottschalk pool.

Butler County: Bedell & Catt Drilling Co. 1 Mellor, SW SW SW 1-24s-3e. IP 83 BOPD, 50% water, 41°, Mississippian 2,507-09 ft. TD 2,794. Opens West Mellor pool.

Pratt County: Artnell Oil Co. 1 Rose, NW NW NE 27-28s-11w. IP 24 BOPD, 40% water, 40.5°, Viola 4,337-42 ft. TD 4,595 ft. Opens Schoolteacher pool.

Grant County: Hugoton Production Co. 2-33 Hindmarsh, C NE NE 2,431 M.c.f. of gas per day, Council Grove 2,755-67 ft., 2,820-29 ft., 2,860-64 ft. TD 5,832 ft. New pool.

Sumner County: Shawver-Armour 1 Sydell, SW SW SE 17-30s-1e. IP 3,000 BOPD, 49°, Simpson 3,826-36 ft. TD 3,836 ft. Opens Sydell pool.

Beardmore Drilling Co. 1 Nyberg, NE NE NE 12-31s-2w. IP 55 BOPD, 35% water, 43.5°, Mississippian 3,738-52 ft. TD 4,182 ft. Opens Southeast Anson pool.

Cowley County: Bedell & Catt Drilling Co. 1 Lewis, SW NE SE 2-31s-5e. IP 20 BOPD, 5% water, 37°, Mississippian 3,050-52 ft. TD 2,085 ft. Opens Salem pool.

Morton County: Panhandle Eastern Pipe Line Co. and Skelly Oil Co. 1-32 Ryman, C NE 32-33s-41w. IP 2,022 M.c.f. of gas per day, Topeka 3,069-73 ft., 3,075-83 ft. TD 5,472 ft.

Meade County: Skelly Oil Co. 1 D. J. Kolb, NE NE NW 3-35s-29w. IP 1,160 M.c.f. of gas per day. IP 47 BOPD, 38°, Morrow 5,769-72 ft., 5,755-84 ft. TD 5,924 ft. New pay in Mohler pool.

Stevens County: Hugoton Production Co. 2-35 Cavner, C SE NE 35-31s-39w. IP 7,418 M.c.f. of gas per day, Council Grove 2,765-2,850 ft., 2,885-2,921 ft. New field.

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NO LUBRICATION · NO MAINTENANCE · NO WEARING PARTS

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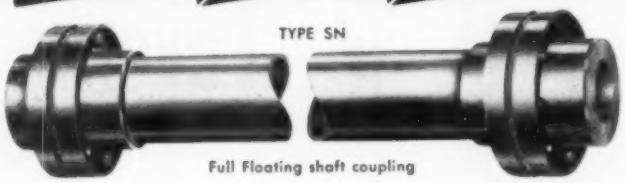

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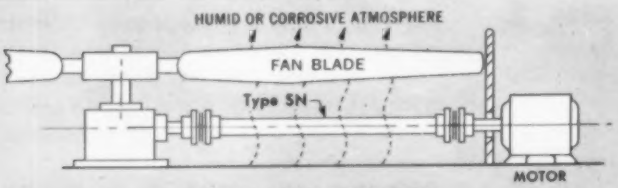

COOLING TOWER INSTALLATION

In the typical cooling tower installation shown above, the motor — outside the humid or corrosive atmosphere — is connected by a floating-shaft coupling to the gear box under the large slow-speed, horizontal-blade fan.

Write for engineering catalog 51A, and the name of your nearest Thomas representative

THOMAS FLEXIBLE COUPLING COMPANY

WARREN, PENNSYLVANIA, U.S.A.

UTAH

Uintah County: Gulf 5 Brennan-Federal, 18-7s-21e. IP 134 BOPD, 23 BWPD, Green River 6,712-22 ft., 6,914-26 ft., 6,950-70 ft., 7,036-48 ft., Wasatch 7,101-12 ft. TD 7,225 ft.

WYOMING

Sublette County: Delco Petroleum-Bintliff 1 Deer Hill Unit, 32-30n-113w. IP 1,104 M.c.f. of gas per day, First Frontier 7,942-7,998 ft., Second Frontier 8,425-42 ft., 8,448-55 ft., 8,500-18 ft., 8,538-48 ft., 8,558-8,604 ft. TD 9,687 ft. Opens Bridger basin pool.

EASTERN NEBRASKA

Harlan County: W. E. Wickizer 1 Battin, C N½ 15-2n-18w. IP 35 BOPD, Lansing-Kansas City 3,396-98 ft., 3,431-44 ft., 3,450-54 ft., 3,477-80 ft., 3,489-94 ft. 3,526-28 ft., 3,547-51 ft. TD 3,650 ft. New pool in South Central Nebraska

ILLINOIS

Gallatin County: R. S. Thompson 1 Rister, SW SW SW 36-7s-8e. IP 18 BOPD, O'Hara 2,850-58 ft. TD 2,970 ft.

Montgomery County: Nelson Allen 2 C. Minter, SW NW 13-7n-4w. IP 3 BOPD, 60 BWPD, Golconda 624-637 ft. TD 643 ft. Extension to Panama field.

Coles County: Earnest Zink 1 Dale Goble, NE SE NE 19-12n-11e. IP 3 BOPD, Pottsville 420-435 ft. TD 467 ft. Opens Ashmore pool.

WESTERN NEBRASKA

Kimball County: Shoreline 1 Frederick, C SW NE 31-14n-55w. IP 200 BOPD, "J" sand 6,463-65 ft., 6,469½-70½ ft., 6,476-80 ft. TD 6,525 ft. New pool.

Cheyenne County: Chandler-Simpson 1 Wilson, SW SW NW 19-15n-51w. IP 130 BOPD, "J" sand 5,234-38 ft. TD 5,246 ft. New pool.

ARKANSAS

Miller County: C. A. Lee 4 Paul D. Hon, SWc NE NW 16-16s-26w. IP 150 BOPD, 46°, Hill sand 4,620-27 ft. TD 4,672 ft. New pay in Christmas field.

NORTH LOUISIANA

Concorda Parish: Hunter Jones et al and Carter Oil Co. 1 Whorton-Jones, NEc 25-4n-9e. IP 71 BOPD, 49.2°, Wilcox 6,997-7,002 ft. TD 7,200 ft.

Red River Parish: Louisiana-Mississippi Oil Co. 1 Lawrence, NEc SE 19-14n-11w. IP 217 BOPD, 120 BWPD, 47°, Tuscaloosa 2,505-97 ft. TD 3,006 ft. Opens Westdale pool.

COLORADO

Rio Blanco County: Equity Oil Co. 1 Ryan-Government, 27-2s-99w. IP 1,250 M.c.f. of gas per day, Cretaceous 5,951-55 ft., 5,929-47 ft., 5,969-77 ft., 6,091-99 ft. TD 6,587 ft.

Washington County: Dawson Oil Co. 1 State, C NW NW 16-2s-55w. IP 156 BOPD, "J" sand 5,014-18 ft., 5,022-26 ft. TD 5,084 ft.

Dawson Oil Co. 1 Jolly-358, C SW NW 8-3s-55w. IP 120 BOPD, "J" sand 4,952-58 ft. TD 5,065 ft. Opens Ramp field.

Adams County: Jack Rouse 2 Monaghan, NW NW SW 8-3s-65w. IP 130 BOPD, 8,325-40 ft. TD 8,455 ft.

Garfield County: Gulf Oil Corp. 3 South Canyon-Government, NW SE 7-7s-103w. IP 1,440 M.c.f. of gas per day, Dakota 3,840-52 ft., 3,862-80 ft., 3,914-22 ft., 3,931-41 ft. TD 4,075 ft.

Baca County: Amerada 1 Pride Unit, NW

HOW TO BE A HERO AT INCOME TAX TIME

(And save yourself a few dollars, too!)

FIND YOUR STATE TAX HERE!

Based on tax rates as of October 1, 1957 (in cents per gallon).

	State	Federal	Total
Alabama	7	3	10
Arizona	5	3	8
Arkansas	6.5	3	9.5
California	6	3	9
Colorado	6	3	9
Connecticut	6	3	9
Delaware	5	3	8
Dist. of Col.	6	3	9
Florida	7	3	10
Georgia	6.5	3	9.5
Idaho	6	3	9
Illinois	5	3	8
Indiana*	6*	3	9
Iowa	6	3	9
Kansas	5	3	8
Kentucky	7	3	10
Louisiana	7	3	10
Maine	7	3	10
Maryland	6	3	9
Massachusetts*	5.5*	3	8.5
Michigan	6	3	9
Minnesota	5	3	8
Mississippi	7	3	10
Missouri	3	3	6
Montana*	7*	3	10
Nebraska*	7*	3	10
Nevada	6	3	9
New Hampshire*	6*	3	9
New Jersey	4	3	7
New Mexico	6	3	9
New York (State)	4	3	7
N. Carolina	7	3	10
N. Dakota	6	3	9
Ohio	5	3	8
Oklahoma*	7.5*	3	10.5
Oregon	6	3	9
Pennsylvania*	5*	3	8
Rhode Island	4	3	7
S. Carolina	7	3	10
S. Dakota*	6*	3	9
Tennessee	7	3	10
Texas	5	3	8
Utah*	6*	3	9
Vermont*	6.5*	3	9.5
Virginia	6	3	9
Washington	6.5	3	9.5
W. Virginia	6	3	9
Wisconsin	6	3	9
Wyoming	5	3	8
U. S. Average	5.8	3	8.8

*Changes during year: Ind.—tax was 4¢ before 3/15/57; Mass.—tax was 5¢ before 6/1/57; Mont.—rate will be 6¢ effective 1/16/58; Neb.—rate was 6¢ before 9/20/57; N. H.—tax was 5¢ before 9/1/57; Okla.—rate which was increased on 6/1/57 dropped back to 6.5¢ by 12/31/57; Penn.—tax was 6¢ before 6/1/57; S. D.—tax was 5¢ before 7/1/57; Utah, tax was 5¢ before 5/14/57; Vt.—tax was 5.5¢ before 7/15/57.

STEP #1 **Just tell your friends** that their state gasoline taxes can be deducted on their Federal Income Tax. (Other taxes, such as state and local sales taxes, may also be deducted but under a different formula.)

STEP #2 **It's so easy.** You'll find your state gasoline tax on the tax list on this page. Multiply that by the number of gallons purchased in 1957.

STEP #3 **Here's an example:** Friend "A" drove 10,000 miles last year and got 14 miles per gallon. That's 700 gallons of gasoline. Say your state tax rate is 6¢ a gallon. 700 times 6¢ is $42. So friend "A" gets a $42 deduction on his Federal Income Tax. You're a hero! And you've made a friend for your industry!

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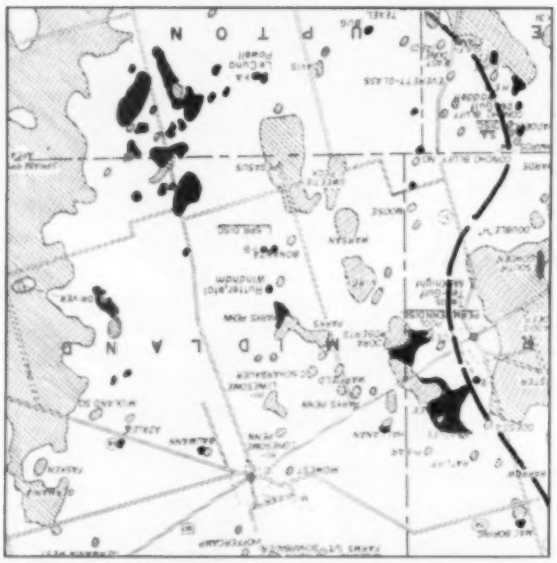
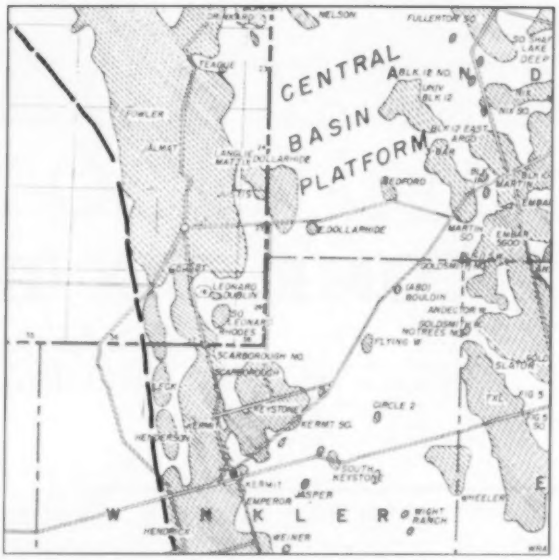




SOMETHING NEW in oil maps for 1957 is shown above. Left is a portion of the Permian Basin Development Map. Field outlines are in gray and 1957's development work is in black. Right is a portion out of the Permian Basin Field Map, showing fields, basins, major towns, and highways. Both maps cover the Permian basin area of Southwest New Mexico and West Texas. Published by Midland Map Co., Midland, Tex.

NW SE 23-33s-42w. IP 1,426 M.c.f. of gas per day, Topeka 3,052-66 ft. TD 5,239 ft. New gas pool.

Morgan County: L. J. Williamson and Kissinger & Co. 1 Matthews, C SE NE 12-4n-60w. IP 930 BOPD, 37.6°, "D" sand 6,182-88 ft., 6,192-96 ft. West Bijou discovery.

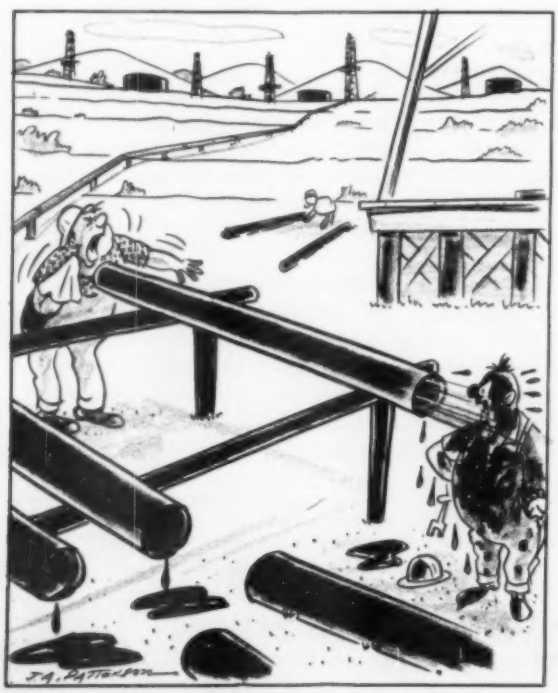
1 Bijou Irrigation District "A," 8-4n-59w. IP 13,500 M.c.f. of gas per day, "D" sand 6,072-88 ft. Bijou field discovery.

Moffat County: Malco Refineries 1 Federal, 23-6n-90w. IP 216 BOPD, Tow Creek 6,210-6,265 ft. Niobrara 6,297-6,675 ft. TD 6,675 ft.

Routt County: The Texas Co. 1 State-Colvert, SW¼ of NW¼ 17-6n-86w. IP 3 BOPD, 35.9°, Niobrara 2,696-3,200 ft. TD 3,200 ft. Opens South Tow Creek.

Tennessee Gas Transmission Co. 1 U.S.A.-James, NE NE NE 25-6n-86w. IP 152 BOPD, 40°, Niobrara 4,094-4,800 ft. TD 5,620 ft. Curtis Anticline discovery.

Weld County: Stuarco 1 Dickerson, C SE NE 18-6n-66w. IP 20 BOPD, 60%



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OFFICES IN ALL PRINCIPAL OIL AREAS

Sussex 4,366½-72½ ft. TD 4,854 ft. New pool.

Logan County: British-American Oil Producing Co. 1 Monroe "M", C SE NW 9-19n-54w. IP 1,800 M.c.f. of gas per day, "D" sand 5,074-85 ft. TD 5,305 ft. New pool.

KENTUCKY

Muhlenberg County: R. E. Bivens et al 1 W. Warren, 9-H-28. IP 15 BOPD, Bethel 1,446-56 ft., McClosky 1,686-1,700 ft. TD 1,743 ft. Extension to Rhodes School pool.

Pensacola Drilling Co. 1 Putnam, 20-I-27. IP 30 BOPD, Bethel 1,691-1,702 ft. TD 1,704 ft. Opens West Sharon School pool.

Union County: K. R. Ingle 1 Willet, 18-P-20. IP Pennsylvanian 885-893 ft. TD 900 ft. Opens Utley pool.

MONTANA

Stillwater County: Holland American Petroleum Corp. 1 Castle, C NW SE 22-2n-21e. IP shut in gas well. Frontier sand 2,509-18 ft. Opens North Lake basin pool.

Yellowstone County: Barker-Taylor 1 Botts-159, IP 47 BOPD, 3% water, 30.3°, Amsden 6,182-90 ft. TD 6,244 ft. Opens Central Montana pool.

Pondera County: Skelly 1-A State, C SW SE 36-28n-5w. IP 86.2 BOPD, 35.5°, Madison 2,118-20 ft. TD 2,120 ft.

Sheridan County: Amerada 1 J. A. Thorson, C SW SE 21-36n-52w. IP 77 BOPD, 7% water, 39°, Outlook-Silurian pay 8,875-90 ft. TD 9,727 ft. New Outlook area discovery.

Glacier County: G. S. Frary and R. Pattie 1 Moberly, C SW SW 1-37n-5w. IP 1,500 M.c.f. of gas per day, Cut Bank 2,641-56 ft. TD 2,656 ft.

NORTH DAKOTA

Bowman County: Carter and Shell 1 L. L. Johnson, 9-129n-106w. IP 195 BOPD, 19 BWPD, 30.5°, Red River 8,206-21 ft. TD 8,980 ft. Red River discovery.

Divide County: Calvert Drilling Co. 1 Dhuyoetter, C SW NW 33-162n-95w. IP 115 BOPD, 29 BWPD, 35°, Nesson 7,260-64 ft. TD 7,343 ft. Nesson discovery.

Burke County: Petroleum Corp. of America et al 1 Ballantine, C NE NW 6-163n-91w. IP 64.09 BOPD, 17 BWPD, 38.6°, Madison State "A" zone 5,881-86 ft. Madison State "A" zone discovery.

NORTH LOUISIANA

Catahoula Parish, Austral & Crescent 1 Tensas Delta Land Co. "A," SE 11-9n-7e. IP 1,800 M.c.f. of gas per day, Mooringsport 11,307-17 ft. TD 12,573 ft. Opens new pay in Sicily Island pool. Deepest gas production in North Louisiana.

Tensas Parish: Rimrock Tidelands, Inc. 1 L. C. Hopkins, C SW NW 26-10n-11e. IP 1,000 M.c.f. of gas per day, 115 BOPD, 51°, Tuscaloosa Massive sand 9,032-40 ft. TD 9,124 ft. Opens Chambless pool.

Pan American and Carter et al 1 R. D. Shelly Unit, C SE NE NE 30-11n-10e. IP 1,947 M.c.f. of gas per day, Paluxy 9,125-26 ft. TD 12,157 ft. New pay (Paluxy) in Holly Ridge pool.

Concordia Parish: R. H. Alagood et al 1 Fisher Lumber Co., C SE NE 17-16n-8e. IP 26 BOPD, 20 BWPD, 44.5°, Wilcox 5,511-16 ft. TD 6,407 ft. Opens Madkin Bayou pool.

Claiborne Parish: Placid Oil Co. and Carter et al 1 J. S. Odom et al Oil Unit, SE

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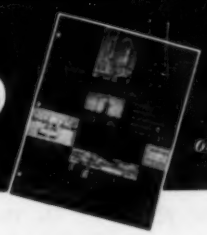

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20-23n-6w. IP 223 BOPD, 49°, Haynesville 9,732-46 ft. TD 10,907 ft. New zone in Northwest Colquitt pool.

TEXAS GULF COAST

Miller & Pierce 1 Quintero, James Douglas Sur., A-19 (2 miles north of Papalote). Absolute open-flow potential 12,000 M.c.f. daily, dry gas, shut-in TP 1,889 psi., perforations 4,601-04 ft. (Frio). TD 5,410 ft. (New field discovery 1 mile southwest of Masingill-Papalote field.)

Chambers County: Meredith & Co. et al 1 Kaiser et al, Lot 8, Block 75, J. M. Duran Sur. IP 193.84 BOPD, ⅛-in., 36.4°, GOR 707 cu. ft. per barrel, TP 1,125 psi., perforations 8,418-24 ft. and 8,434-40 ft. (Frio-Sullivan sand). TD 9,130 ft. (Southwest extension and new oil pay for North Winnie field.)

Colorado County: Robinson Oil & Gas Co. 1 Houck, Section 53, I&GN Sur., A-269 (2 miles north of Rock Island). Absolute open-flow potential 2,650 M.c.f. daily, dry gas, shut-in TP 1,232 psi., perforations 3,341-43 ft. TD 3,400 ft. (New field—2½ miles north of West Rock Island field.)

Goliad County: W. Earl Rowe 2 Wilson, Noah G. Stebbins Sur., A-256 (5 miles northwest of Berclair). IP 35.84 BOPD, ⅛-in., 47.1°, GOR 1,176 cu. ft. per barrel, TP 200 psi., perforations 4,753-58 ft. (Yegua). TD 5,358 ft. (New oil pay in Dallas Husky field.)

Jackson County: Slick Oil Corp. 1 Donnelly, R. Solis Sur., A-73 (5 miles southeast of Inez). IP 82.68 BOPD, 7/64-in., 38°, GOR 1,850 cu. ft. per barrel, TP 750 psi., perforations 5,571 ft. (double ring), Frio-UF-214 sand. TD 6,920 ft. (New oil pay in Witte field.)

Lavaca County: North Central Oil Corp. 2 Braunig, Sarah Wilman Sur., A-492. Absolute open-flow potential 9,100 M.c.f. daily, GLR 33 M.c.f. per barrel, 50.2°, shut-in. TP 2,916 psi., perforations 8,637-51 ft. (Wilcox). TD 9,685 ft. (New gas-condensate pay in Southwest Provident City field.)

Liberty County: Gulf Oil Corp. et al Unit, James Eldridge Sur., A-182 (5 miles southeast of Cleveland). Shut-in gas well, no gage, perforations 9,408-24 ft. TD 9,790 ft. (New gas reservoir 1¾ miles southwest of Cleveland field.)

Live Oak County: Sunray Mid-Continent Oil Co. 1 Allen et al, W. S. McCampbell Sur., A-289 (15 miles south of George West). IP 110.40 BOPD, ⅛-in., 43.6°, GOR 1,220 cu. ft. per barrel, TP 1,100 psi., perforations 4,990-98 ft. (Yegua). TD 5,765 ft. (New pay in Ramirena field.)

Siboney Petroleum Corp. 1 Hinton, Dennis McGowan Sur., A-29. Absolute open-flow potential 3,900-M.c.f. daily, GLR 35,810 M.c.f. per barrel, 45.9°, shut-in TP 2,548 psi., perforations 7,540-52 ft. (Wilcox-Luling sand), and 2,700 M.c.f. daily. GLR 112 M.c.f. per barrel, 66.1°, shut-in pressure 2,475 psi., perforations 7,303-10 ft. (Wilcox-Slick sand). TD 8,209 ft. (New gas-condensate reservoirs in Marsden area—2½ miles southeast of Oakville.)

Chiles Drilling Co. and S. H. Howell 1 Weston, Tom Weston Sur., A-954 (2 miles northeast of Anna Rose). Absolute open-flow potential 950 M.c.f. daily, GLR 137 M.c.f. per barrel, 53.1°, shut-in TP 1,243 psi., perforations 4,530-37 ft. (Pettus sand). TD 4,830 ft. (New field discovery.)

Refugio County: Hewitt & Dougherty and P. R. Rutherford 7-E Roche, Block 15, Kathleen D. Roche Subd., Downey Sur. (15 miles southwest of Woodsboro). IP 173.4 BOPD, 15/128-in., 37.2°, GOR 784 cu. ft. per barrel, 1,400 psi., perforations 7,230-43 ft. (Frio 7,200 ft. sand), and 155 BOPD, ⅛-in., 40.3°, GOR 636 cu. ft. per barrel, 955 psi., perforations 6,399-6,403 ft. (Frio-Massive sand). TD 7,300 ft. (New pays in Encino field.)

Victoria County: Rodney DeLange et al 1 McCan et al, Section 48, IRR Sur., A-417 (12 miles northeast of Victoria). Absolute open-flow potential 9,200 M.c.f. daily, dry gas, shut-in TP 1,685 psi., perforations 4,020-28 ft. (Frio). TD 4,514 ft. (New pay in Salem field.)

Wharton County: Otis Russell 1 Berberich, Lot 87, Block 31, Joseph Clements Sur., A-82 (3¾ miles south of Lane City). Absolute open-flow potential 15,500 M.c.f. daily, dry gas, shut-in TP 1,593 psi., perforations 3,909-14 ft. (Miocene). TD 6,000 ft. (New pay in Magnet-Withers area.)

ALBERTA

Mobil 4-19 Leslieville, LSD 4, 19-39-5w5. Viking-Blairmore oil well. TD 11,768 ft.

Hudson's Bay Oil & Gas Co., Ltd., 4-33 Schneider Lake, LSD 4, 33-41 13w4. Viking oil well. TD 2,680 ft.

Texaco A-6-15 Gladstone Creek, LSD 6, 15-5-2w5. Mississippian gas well. TD 13,900 ft.

British-American-Triad et al 12-30 Lovett River, LSD 12, 30-46-18w5. Mississippian gas well. TD 12,560 ft.

BRITISH COLUMBIA

Triad 1 Beatton River, 38-J-94-H-2. Triassic "D" oil well. TD 4,684 ft.

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THE OIL AND GAS JOURNAL
P. O. Box 1260 **Tulsa, Okla.**

Petrofina Hires a Veteran

. . . to find production to meet a crude deficit. Ralph Damp spent 30 years with Jersey Standard and knows his job.

THE JOB of building an exploration and production department for a small company "dedicated to bigness" is the challenging task facing Ralph Damp.

He's been at it since December 11, when Harry Jackson, president of American Petrofina, Inc., hired him for the job. It was Jackson who described Petrofina as being "dedicated to bigness."

This rapidly-expanding affiliate of the international Petrofina organization has come a long way in a short time—but it still has a much longer way to go.

A year and a half ago, American Petrofina was little more than an office in New York. Today it's a producer, refiner, transporter, and marketer. It has acquired Panhandle Oil Corp., American Liberty Oil Co., and Atlas Corp.

Its production is around 10,000 bbl. per day and its refining capacity about 40,000 bbl. Thus the company has a crude deficit of some 30,000 bbl.

Making up this deficit is a part of Damp's job. He hopes to do it by acquiring properties and finding new production.

Petrofina is not yet in position to afford the full-scale department typical of big integrated companies. This means that the department he heads will be, as he puts it, "small but alert and agile."

Another part of Damp's job is to integrate the company's rather far-flung producing operations. Petrofina's present 10,000 bbl. comes from Wyoming at one extreme and Louisiana and Mississippi at the other.

Jersey background . . . Ralph Damp brought substantial qualifications to his job. He spent 30 years in crude-oil producing activities with Standard Oil Co. (N. J.) and its affiliates. He's been in oil since receiving a chemical-engineering degree from the University of Minnesota in 1926.

He was born in Illinois in 1905 and grew up there. He went to grade school in Mercer County and high school at Aledo. A somewhat casual letter from a friend suggested that he go to Oklahoma after he graduated from college. He accepted the suggestion, went to Tulsa, and found a job in Carter Oil Co.'s production lab.

Damp spent almost 18 years with Carter, a Jersey producing affiliate. His first job after leaving the lab in Tulsa was in the natural-gasoline operations in Seminole and other Oklahoma fields. He moved into producing and drilling operations and then got into water flooding, a relatively new development in the Mid-Continent area. At that time—1933-35—he was division petroleum engineer for northern Oklahoma and Kansas.

In 1937 Damp took a big step up the ladder when he was named production superintendent for Illinois and later division superintendent. His native state, at that time, was enjoying a rebirth of oil vigor. In 1942 he moved to Montana as Carter's northwest division manager. He was in charge when Carter expanded into refining and marketing in the region.

Damp returned to Tulsa in 1944 as acting general superintendent of production for Carter. Later in the same year he was made general production superintendent.

He held that post for only a short time before being tabbed for his first foreign assignment. Standard Oil Co. of Cuba was undertaking an active exploratory campaign on the island. Damp was picked to direct it. He went to Havana in December of 1944.

Two years later he was summoned to New York to become a member of the staff of the production coordination department of the parent Jersey Standard. He spent 10 years with the department. His interests, at various times, embraced Latin America, Canada, western Europe, and North Africa.

Since Jersey . . . Between his long tenure with Jersey and his present affiliation with American Petrofina was a 6-month tour as president of Swan-Finch Oil Corp.

American Petrofina, though affiliated abroad, is a highly autonomous operation and intends to confine its interests to the continental United States. Its logical area of expansion would be in properties adjacent to those it now holds. However, it will go anywhere in the 48 states that sound policy dictates.

This geographical restriction doesn't dismay Damp. By his own admission, his extensive foreign travels have convinced him that the United States is the best place to live and work.

He is married and has one married daughter and two grandchildren.

"The first 50 years I worked for myself," he says. "The next 50 are to be devoted to my grandchildren." Also he likes to golf and fish and work in the Manhattan Church of Christ.

Joe E. Wirsching, Humble Oil & Refining Co. senior petroleum engineer in Midland, Tex., has been transferred to Denver City, Tex., as district petroleum engineer.

Morris B. Jones has been promoted by Northwest Production Corp. from drilling engineer in Farmington, N. M., to assistant manager of production in Albuquerque.

Personals

DR. ALEX LEWIS

Dr. Alex Lewis, Jr., has been named manager of Gulf Oil Corp.'s petrochemicals department. He succeeds **L. O. Crockett,** who was recently elected president of Goodrich-Gulf Chemicals, Inc. Lewis has been with Gulf since 1935. He was formerly in charge of chemical marketing for the petrochemicals department and at one time was chief product engineer, product development department.

L. B. McCune, drilling superintendent with R. W. Rine Drilling Co., has been transferred to Liberal, Kans., from Pratt, Kans.

Ralph Gordon Anderson, geophysical supervisor in Midland, Tex., for Standard Oil Co. of Texas, has been transferred to Houston as geophysical analyst.

Loyd Thompson has been promoted by Continental Oil Co. from general maintenance engineer to chief maintenance engineer in the company's headquarters manufacturing department, Ponca City, Okla. He succeeds **J. O. Thoen,** who has retired.

Alvah E. Esser, manager of the engineering department of Socony Mobil Oil Co., Inc., has retired after 43 years with the company. Esser is a former superintendent of Socony's Brooklyn, N. Y., and Buffalo, N. Y., refineries.

Dr. John T. Smith has been named manager of the department of chemistry in Shell Development Co.'s reorganized exploration and production research division, Houston. **Dr. Gordon Rittenhouse** will manage the department of geology and **Dr. Charles H. Fay** will be manager of the department of physics and mechanics. In exploration research, **Dr. R. H. Nanz, Jr.,** will be manager of the geological department. **Dr. F. A. Van Melle** has been appointed geophysical department manager. Production research will also have two departments, exploitation and mechanical, with **G. E. Archie** and **J. R. McEntee** as managers. The changes result from consolidation of Shell Development's exploration and production research division and Shell Oil Co's technical-services division.

Joe McNamee, geologist with Champlin Oil & Refining Co., has transferred to Calgary from Casper, Wyo.

Warren L. Davis, Continental Oil Co. division geophysicist in New Orleans, has been transferred to Houston in the same capacity.

Morris E. Henderson, district lease foreman in Spraberry field for Warren Petroleum Corp., has joined Gulf Oil Corp as senior petroleum engineer in Crane, Tex.

David H. Hill, engineer trainee with Phillips Petroleum Co., has been promoted to production engineer and transferred from Alvin, Tex., to Morgan City, La.

Parker A. Robertson, division economic geologist in Gulf Oil Corp.'s Houston production division, has been transferred to Bahamas Gulf Oil Co. as special representative. He will be in charge of Gulf's exploration and production operations in the Bahamas. Robertson will headquarter in Nassau.

John W. Clark, assistant manager of Magnolia Petroleum Co.'s exploration division, has been elected a vice president and director of the company. As director in charge of exploration, Clark will supervise exploration in the 18 states making up Magnolia's operating territory. He has been with the company since 1932.

J. E. Taylor, director of Gulf Research & Development Co.'s automotive engineering division, has been named director of automotive research. He will headquarter in Detroit.

H. D. Wilson has been appointed assistant manager of Sinclair Pipe Line Co.'s eastern products pipeline division. He will headquarter in Marion, Ohio. **D. S. Kauffman** has been named district superintendent of Sinclair's Woodbury, N. J., office to succeed Wilson.

James D. Stahl, field drilling and production superintendent for Union Producing Co., has been transferred to Refugio, Tex., from Houma, La. Stahl joined Union in 1941. He was field drilling and production superintendent in Houston before transferring to Houma last year.

M. A. Wright, coordinator of world-wide producing activities for Standard Oil Co. (N.J.), has been named a candidate for election to the board of directors at the company's annual meeting May 28. Wright has been with Jersey Standard and its affiliates since 1933. He became deputy coordinator of producing operations for the parent company in 1949. Two years later he was elected executive vice president of International Petroleum Co., Ltd., and the next year was transferred to Carter Oil Co. in the same capacity. He was appointed coordinator of world-wide producing activities for Jersey in 1954. Wright's election to the Jersey board will bring the number of directors to 15.

Ronald R. Grost, geologist with Atlantic Refining Co., has been transferred to Tulsa from Dallas. **J. L. Querry** has been transferred from Dallas to Midland, Tex., also as geologist.

Tate Clark, Phillips Petroleum Co.'s division land and geological manager in Amarillo, Tex., since 1955, has been transferred to Caracas as chief geologist for Venezuela.

L. L. Limes has been named New Orleans district geologist in charge of exploration for Kerr-McGee Oil Industries, Inc. **Jerrie Pittman** has been appointed district geologist in charge of development. **Robert B. Capps** remains southern division manager in charge of the New Orleans office.

Carl A. Lemon has been named manager and **W. G. Noble** assistant to the manager of Sunray Mid-Continent Oil Co.'s newly organized natural gasoline and LPG purchases and sales division. The division will handle sales of products from Sunray's gasoline and cycling plants and will buy LPG and natural gasoline for refinery operation.

W. H. McPhail has been promoted by Tidewater Oil Co. from area engineer at Drumright, Okla., to area superintendent there. He succeeds **E. L. Layman,** who has retired. **E. O. Smelser,** senior field engineer at Odessa, Tex., has been transferred to Drumright as area engineer, replacing McPhail. **T. C. Gibson,** senior field engineer at Hobbs, N. M., has been promoted to area engineer at Sallyards, Kans.

API Southwest District Chapter Elects Officers

E. W. Showan, seated, left, of Gulf Oil Corp., Midland, Tex., was elected new chairman of the southwestern district of the API Division of Production at the district's annual spring meeting in Fort Worth March 14. Other new officers include H. P. Logan, seated, right, El Paso Natural Gas Co., Farmington, N. M., vice chairman for Northeast New Mexico; and, standing, left to right, John P. McNaughton, Neville Penrose, Inc., Fort Worth, secretary-treasurer; J. M. Garlick, Shell Oil Co., Wichita Falls, vice chairman for North Central Texas; W. R. Johnston, Aspen Drilling Co., Albuquerque, chairman of district advisory committee; and Alan Antweil, Hobbs Pipe & Supply Co., Hobbs, vice chairman for Southeast New Mexico. Not in the photo are Jerry Ormand, Ormand Drilling Co., Midland, Tex., vice chairman for West Texas; L. L. Cox, Cities Service Oil Co., Levelland, Tex., vice chairman for the South Plains; and T. C. Aitken, Sun Oil Co., Gainesville, vice chairman for Northeast Texas.

L. F. Burns, petroleum engineer, has been transferred to Cortez, Colo., from Electra, Tex., by The Texas Co.

R. C. Siegfried, seismologist, has been transferred by Superior Oil Co. from Ardmore, Okla., to Midland, Tex.

N. B. Dortch has been transferred by Henry Black Drilling Co. from Lovington, N. M., where he was driller, to Seminole, Tex., as roughneck.

J. H. Sullivan, regional petroleum engineer for Atlantic Refining Co., Dallas; **Alden S. Donnelly,** vice president and director of Honolulu Oil Corp., Midland, Tex.; and **A. E. Chester,** vice president and manager of the producing division of Magnolia Petroleum Co., Dallas, received citations for outstanding service to the American Petroleum Institute during the annual spring meeting of the API Division of Production's southwestern district at Fort Worth March 12-14.

Personals

Robert Lewis, geologist with Superior Oil Co., has been transferred to Casper, Wyo., from Ardmore, Okla.

Henry M. Paulsen, manager of refining and pipelines and a director of Bankline Oil Co., has resigned. He will open consulting offices.

Gordon D. Brindell has been named senior research chemist in Continental Oil Co.'s petrochemical research division, Ponca City, Okla.

Ross F. Madole has been elected a member of the board of directors of Magnolia Pipe Line Co., replacing **David Levy,** who recently retired.

Leslie H. True, president of Magnolia Pipe Line Co., has been elected to the board of directors of the Mercantile National Bank at Dallas. True also is a member of the boards of Magnolia Pipe Line and Magnolia Petroleum Co.

R. M. Strom has been named assistant Mid-Continent exploration division geologist for Cities Service Oil Co. **J. E. Rakaskas,** Wichita, Kans., district geologist, replaces Strom as district geologist in Oklahoma City. **Earl Brandt,** geologist in Oklahoma City, transfers to Wichita as district geologist.

A. L. Stegner, corrosion and communications superintendent for Tennessee Gas Transmission Co., has been named technical administrative assistant to **J. J. King,** vice president, in the project-development section. **Leonard R. Brooks,** formerly process engineer for Bay Petroleum Corp., TGT subsidiary, has been appointed chemical engineer in the Tennessee Gas project-development section.

DEATHS

Jacob Ado'phus Warren, 76, retired president of Kinney-Coastal Oil Co., died March 17 at his home in Boulder, Colo., after a long illness. Warren became president of the firm in 1941 succeeding **Eugene D. Milliken,** who was elected to the U. S. Senate from Colorado. Warren retired last year.

Russell E. Havenstrite, 62, founder and president of California Western Oil Co., and a general partner in Havenstrite Oil Co., died March 18 in Santa Monica, Calif., of a heart ailment. Havenstrite got his start in California's Signal Hill oil field boom. One of his most recent ventures was a wildcat operation in Alaska. In addition to extensive oil holdings, Haverstrite also was active in the mining industry.

Ralph Stanley, Waynesboro, Miss., independent oil operator, died March 11 after a heart attack.

Charles Otto Ellis, 77, retired superintendent for Oliphant Oil Co., died March 15 in a Tulsa hospital.

Hugh Ellison Smith, 67, who retired last year as Malvern, Ark., superintendent for Texas - Illinois Natural Gas Pipe Line Co., died March 13 in Tulsa. Smith was with Cities Service Oil Co. and Natural Gas Pipe Line Co. of America before joining Texas-Illinois.

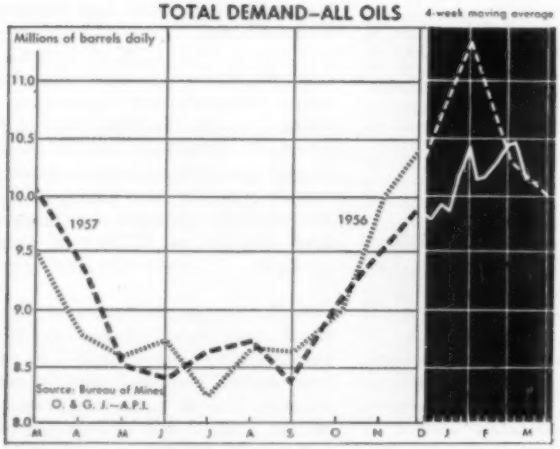
Iliff Anderson, chief district geologist for Western Gulf Oil Co. in Bakersfield, Calif., died March 7 in a Bakersfield hospital.

Latest Figures . . . Industry Trends

A QUICK LOOK AT THE HIGHLIGHTS

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	6,269,500	DOWN	49,800	DOWN	1,458,591
Crude stocks	286,085,000	DOWN	1,910,000	UP	34,092,000
Completions	833	DOWN	44	DOWN	317
Refinery runs	7,479,000	DOWN	9,000	DOWN	619,000
Gasoline stocks	216,525,000	UP	1,116,000	UP	10,936,000
Kerosine stocks	17,459,000	DOWN	163,000	DOWN	2,242,000
Distillate stocks	81,853,000	DOWN	2,165,000	UP	2,254,000
Residual stocks	55,061,000	UP	258,000	UP	18,778,000
Four-product stocks	370,898,000	DOWN	954,000	UP	29,726,000
Total imports	1,532,500	DOWN	221,400	DOWN	164,700

TOTAL DEMAND—ALL OILS 4-week moving average



Jittery suppliers cut gasoline prices

SPOT PRICES on the Group 3 market drifted lower, starting about the middle of the month. The lower prices resulted from general market pressure that has existed for some time but were triggered by shifts in formal postings.

Many of the spot sales in the Group 3 area are based on quotations published in the Wall Street Journal. For some time, spot material has been moving at discounts off these quotations. When these published prices were lowered, some suppliers continued selling on the spot market with the same discounts off the new quotations that they had been allowing off the old base prices. The end result was a price drop of .25 cent for most spot sales of gasoline.

The same reduction was made for distillate fuels, but the change here was not too important since most of the heating season has passed.

In the New York Harbor area, market reports indicate that some suppliers are offering discounts off the new postings for light fuels. These offers are not developing much new business since many heating-oil distributors are holding purchases a little below current needs in order to have near-empty tanks when the season is over.

Some distributors are not sure that prices have reached the low point for the season. To counteract the sales drop due to this type of thinking, a few suppliers are offering price protection for the month of March and in some cases through April.

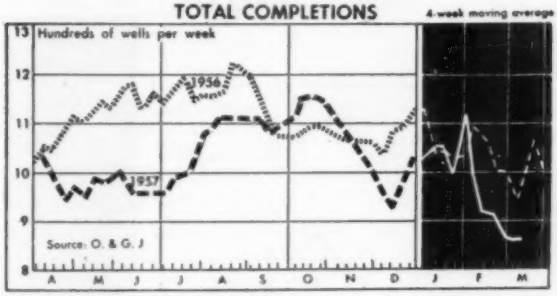
Stocks of distillate fuels, located east of California, are down about 3 million barrels from last year. Kerosine stocks are off about the same amount. Stocks at this time last year were too high by at least 10 million barrels. The excess continued through January of this year, but inventory reductions since that time have taken most of the pressure off light heating oils.

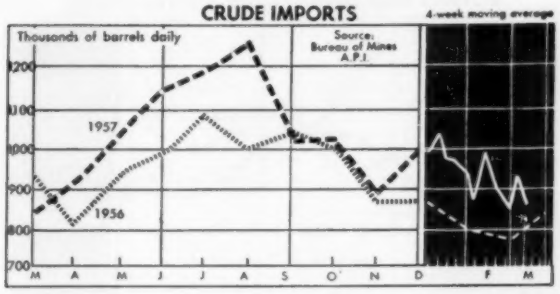
If refinery runs are held low enough to work off some of the surplus gasoline in storage, supply-demand balance for middle distillates will support reasonable prices for these products this summer.

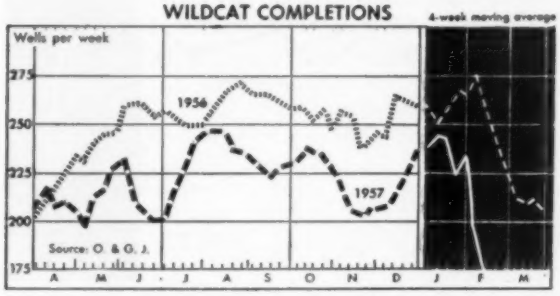
If refiners hold crude runs low enough to clean up surplus gasoline stocks, crude stocks will stay above normal for at least 2 months. Crude production has dropped to about 6,275,000 bbl. daily. Crude imports are averaging near 950,000 bbl. daily to bring total new crude supply to 7,225,000 bbl. daily.

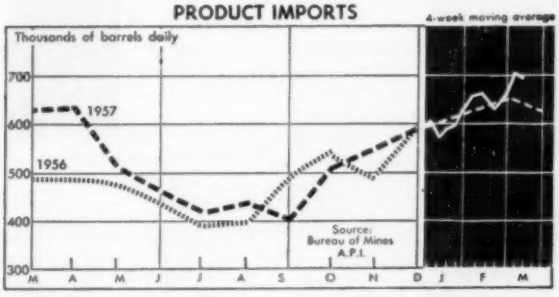
Crude exports, transfers, and losses will reduce new supply to about 7,130,000 bbl. daily. Crude inventories are about 16 million barrels too high. To work this off in 2 months would call for withdrawals of 260,000 bbl. daily.

New supply of 7,130,000 bbl. daily plus 260,000 bbl. daily from storage would call for runs averaging 7,390,000 bbl. daily. Refiners may want to drop below that figure in April.







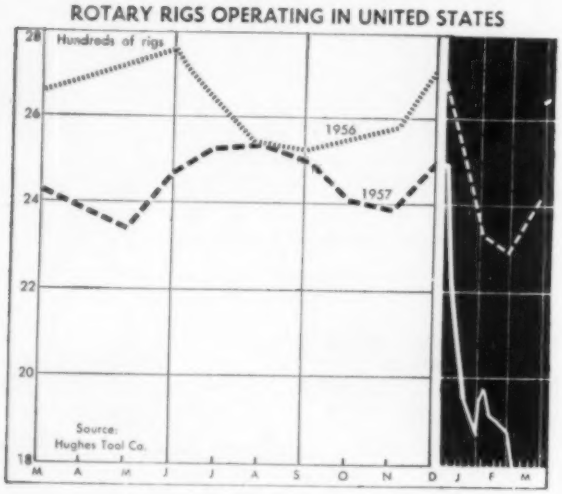


WEEKLY WELL COMPLETIONS . . . WEEK ENDED MARCH 15, 1958

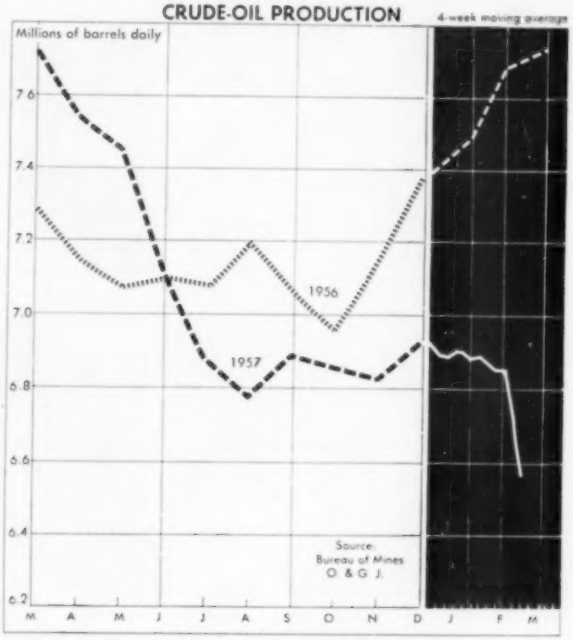
	Total wells							Cumulative		Total wildcats					Cumulative	
	Total	Crude	Cond.	Gas	Dry	Service	Footage	1958	1957	Total	Crude	Cond.	Gas	Dry	1958	1957
Alabama	3	2	0	0	1	0	36,013	15	15	1	0	0	0	1	6	5
Arkansas	4	1	0	0	3	0	14,846	139	227	3	0	0	0	3	30	34
California	29	20	0	0	9	0	140,448	434	437	9	1	0	0	8	78	115
Colorado	19	3	0	3	13	0	101,205	160	232	10	0	0	0	10	87	156
Illinois	34	17	0	0	16	1	81,966	418	502	7	0	0	0	7	78	121
Indiana	14	2	0	0	12	0	20,512	153	134	7	1	0	0	6	55	26
Kansas	91	54	0	2	33	2	310,813	850	909	15	2	0	0	13	172	155
Kentucky	12	2	0	1	8	1	12,824	173	314	3	0	0	0	3	24	70
Louisiana	63	31	2	14	16	0	443,597	686	794	7	0	0	2	5	83	132
North	31	12	0	12	7	0	97,012	251	305	3	0	0	2	1	34	36
South	25	15	2	2	6	0	271,535	343	352	3	0	0	0	3	45	79
Offshore	7	4	0	0	3	0	75,050	92	137	1	0	0	0	1	4	17
Michigan	5	1	0	0	4	0	14,574	64	83	2	0	0	0	2	25	36
Mississippi	7	2	0	0	5	0	70,069	85	69	4	0	0	0	4	47	33
Montana	4	4	0	0	0	0	20,873	85	64	0	0	0	0	0	40	22
Nebraska	8	2	0	0	6	0	47,260	142	161	2	0	0	0	2	70	91
New Mexico	37	28	0	5	4	0	165,500	470	415	1	0	0	0	1	68	64
West	16	10	0	5	1	0	79,976	232	150	0	0	0	0	0	34	24
East	21	18	0	0	3	0	85,524	238	265	1	0	0	0	1	34	40
New York	10	5	0	0	0	5	13,500	111	....	0	0	0	0	0	9	....
North Dakota	8	6	0	0	2	0	54,977	91	71	3	1	0	0	2	34	28
Ohio	12	5	0	3	3	1	25,058	183	214	0	0	0	0	0	3	3
Oklahoma	103	49	1	6	39	8	377,592	1,510	1,434	18	5	0	2	11	212	166
Pennsylvania	0	0	0	0	0	0	0	16	*179	0	0	0	0	0	1	*22
Texas	319	178	9	15	108	9	1,331,219	3,901	4,609	64	7	2	1	54	831	1,292
Dist. 1	13	4	0	0	9	0	34,910	194	228	6	0	0	0	6	77	93
Dist. 2	11	4	2	0	5	0	58,720	121	149	3	0	0	0	3	33	67
Dist. 3	23	11	3	0	9	0	150,804	262	403	4	0	0	0	4	45	137
Dist. 4	21	8	1	1	11	0	104,212	242	295	5	0	1	0	4	79	112
East	20	10	2	0	8	0	103,973	282	264	6	0	1	0	5	82	81
Dist. 7-B	25	9	0	1	13	2	80,655	465	640	8	1	0	0	7	147	236
West	103	72	0	2	28	1	494,491	1,188	1,281	24	4	0	1	19	190	216
Dist. 9	72	41	0	1	24	6	187,570	852	1,043	8	2	0	0	6	154	324
Dist. 10	31	19	1	10	1	0	115,884	295	306	0	0	0	0	0	24	26
Utah	17	14	0	0	3	0	100,288	101	28	3	0	0	0	3	17	16
West Virginia	15	2	0	12	1	0	38,680	156	150	1	0	0	1	0	6	9
Wyoming	18	15	0	1	2	0	76,198	178	181	1	0	0	0	1	64	66
Misc. (Fla.)	1	0	0	0	1	0	6,132	28	19	1	0	0	0	1	22	13
Total U. S.	833	443	12	62	289	27	3,504,144	10,149	11,241	162	17	2	6	137	2,062	2,675
Total prev. week	877	45[illegible]	24	42	342	16	3,652,606	.....	.....	168	21	2	1	144	.....	.....
Cum. 1958	10,149	5,125	230	735	3,845	214	42,894,041	.....	.....	2,062	195	26	77	1,764	.....	.....
Western Canada	65	33	0	2	26	4	370,726	517	519	29	3	0	2	24	183	138

*Includes New York.

ROTARY RIGS OPERATING IN UNITED STATES



CRUDE-OIL PRODUCTION



ACTIVE ROTARY RIGS*

	3-17-58	3-10-58	3-3-58	3-18-57
Alabama	5	6	6	14
Arkansas	20	20	20	19
Arizona	....	1	1	....
California	80	84	85	96
Colorado	27	22	29	40
Florida	1	2	2	1
Georgia	....	....	....	1
Idaho	....	....	....	....
Illinois	15	18	39	51
Indiana	1	1	1	6
Iowa	3	....	3	1
Kansas	71	84	100	166
Kentucky	1	3	3	7
Louisiana	327	314	324	427
North	29	22	30	53
South	237	231	234	274
Offshore	61	61	60	100
Maryland	....	....	....	1
Michigan	7	8	7	10
Missouri	....	....	....	....
Montana	21	22	25	27
Mississippi	34	36	43	19
Nebraska	12	19	22	30
Nevada	....	....	....	....
New Mexico	109	100	106	116
New York	1	1	1	1
North Dakota	33	34	32	24
Ohio	....	....	1	....
Oklahoma	132	183	187	250
Oregon	....	....	....	1
Pennsylvania	12	12	10	10
South Dakota	....	....	....	2
Texas	699	738	733	1,052
Gulf Coast	156	153	142	223
Offshore	3	2	....	6
West	293	309	308	398
North	207	233	244	372
East	40	41	39	53
Tennessee	....	....	....	....
Utah	38	42	42	31
Washington	2	1	....	....
West Virginia	4	4	4	1
Wyoming	39	42	43	46
Virginia	....	....	....	....
Total United States	1,694	1,797	1,869	2,450
Western Canada	208	216	240	243
Eastern Canada	1	....	....	....
Grand total	1,903	2,013	2,109	2,693

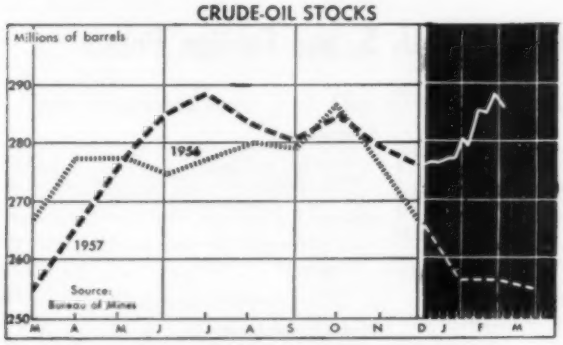
*Hughes Tool Co.

DAILY AVERAGE PRODUCTION FOR WEEK

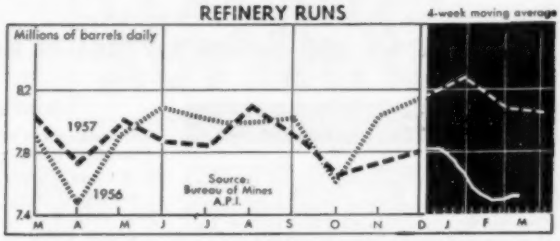
	March 15, 1958			Mar. 8
	Crude oil	Lease condensate	Total	total
Alabama	16,000	.....	16,000	15,925
Arkansas	83,050	200	83,250	83,200
California	885,100	.....	885,100	886,400
Colorado	141,600	.....	141,600	140,350
Eastern	48,400	.....	48,400	48,000
Florida	1,275	.....	1,275	1,275
Illinois	233,700	.....	233,700	231,200
Indiana	26,900	.....	26,900	30,700
Kansas	†283,750.	.....	†283,750	†256,925
Kentucky	39,700	.....	39,700	40,300
Louisiana	729,550	89,300	818,850	818,925
North	111,800	2,800	114,600	114,675
South	617,750	86,500	704,250	704,250
Michigan	24,200	.....	24,200	24,300
Mississippi	99,400	4,975	10 ,375	104,375
Montana	76,600	.....	76,600	75,000
Nebraska	54,175	.....	54,175	54,650
Nevada	150	.....	150	150
New Mexico	258,275	6,600	264,875	264,875
North Dakota	31,700	.....	31,700	35,300
Oklahoma	†500,700	.....	†500,700	†579,400
Texas	2,238,000	63,850	2,301,850	2,301,850
Dist 1	44,000	500	44,500	44,500
Dist. 2	93,000	9,300	102,300	102,300
Dist 3	327,000	32,000	359,000	359,000
Dist. 4	161,000	7,400	168,400	168,400
Dist. 5	28,000	400	28,400	28,400
Dist. 6	100,000	7,400	107,400	107,400
East Texas field	125,000	.....	125,000	125,000
Dist. 7-B	132,000	150	132,150	132,150
Dist. 7-C	115,000	3,650	118,650	118,650
Dist. 8	816,000	1,500	817,500	817,500
Dist. 9	190,000	900	190,900	190,900
Dist. 10	107,000	650	107,650	107,650
Utah	22,300	.....	22,300	17,150
Wyoming	309,850	.....	309,850	308,850
Others	‡200	.....	‡200	‡200
Total U. S.	6,104,575	164,925	6,269,500	6,319,300
Change from previous week, down			49,800	
Canada	†464,700	.....	†464,700	†479,300
Total U. S. Prod.-Jan. 1-March 15				500,346,190 bbl.
Same period last year (crude plus cond.)				*562,458,761 bbl.

*Includes 10,784,875 bbl. condensate. †Week ended previous Monday. ‡South Dakota.

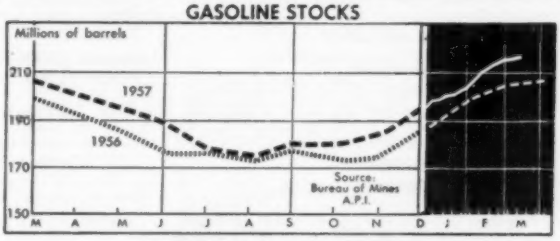
CRUDE-OIL STOCKS



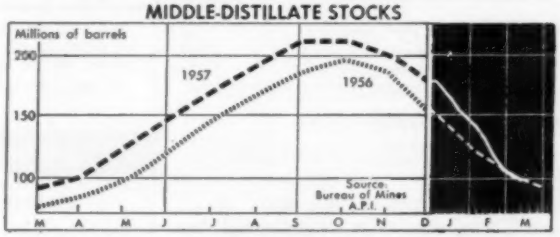
REFINERY RUNS



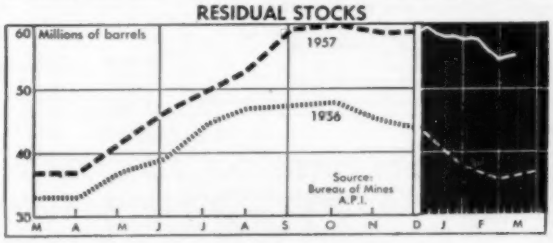
GASOLINE STOCKS



MIDDLE-DISTILLATE STOCKS



RESIDUAL STOCKS



CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

	3-8-58	3-1-58	3-9-57
Pennsylvania Grade	2,910	2,807	2,414
Other Appalachian	1,512	1,483	1,911
Illinois, Indiana, and Michigan	10,879	10,589	9,286
Nebraska and North Dakota	2,365	2,634	1,865
Kansas	9,216	9,799	8,610
Oklahoma	18,513	18,070	21,410
Arkansas	2,875	3,037	2,418
Louisiana	20,097	10,356	19,626
North	3,480	3,313	2,816
South	16,617	17,043	16,810
Mississippi, Ala., and Fla.	2,423	2,638	2,121
New Mexico	8,343	8,311	7,233
Texas	128,347	130,005	113,884
East Texas	9,127	9,040	9,961
West Texas	55,682	57,255	53,791
Texas Gulf	27,810	27,457	21,172
Other Texas	35,728	36,253	28,960
Wyoming	15,266	15,487	16,724
Other Rocky Mountain	7,062	7,076	6,440
California	39,274	38,961	27,175
Foreign	†17,003	16,742	10,576
Total	286,085	297,995	251,993

*Bureau of Mines. †Includes 5,181,000 bbl. in California.

API REFINERY REPORT—MARCH 14, 1958

(Thousands of barrels)

District—	Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.	Stocks‡ Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, March 1957 Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.
East Coast	1,101	493.3	41.0	301.7	207.0	44,629	7,578	26,203	10,441	1,229	504.4	44.7	323.2	219.3
Appalachian:														
District 1	89	38.1	4.9	23.6	7.6	5,158	499	1,675	579	104	40.1	4.6	24.6	9.6
District 2	112	49.6	8.1	24.6	13.7	2,988	341	682	484	109	54.2	7.6	19.0	14.6
Ind., Ill., Ky.	1,347	685.0	88.3	307.0	166.4	40,365	3,443	10,957	4,112	1,400	684.8	71.6	283.2	184.8
Minn., Wis., Dak.	107	49.1	7.3	30.0	13.1	7,090	588	3,697	474	103	48.6	6.5	24.7	7.9
Okla., Kans., Mo.	646	370.2	13.8	181.8	31.1	21,373	717	6,826	993	683	368.7	16.3	156.1	35.2
Inland Texas	265	183.7	4.7	49.9	21.3	9,331	278	1,322	2,065	270	207.0	8.8	53.7	21.6
Texas Gulf Coast	1,780	826.6	136.6	433.3	195.0	30,707	1,772	8,047	4,248	1,953	861.7	106.4	532.2	237.7
La. Gulf Coast	612	334.9	63.0	127.8	44.2	12,519	1,060	4,649	1,210	666	301.8	51.1	183.2	48.5
N. La. and Ark.	94	40.0	6.4	21.3	7.7	5,313	461	1,594	120	93	35.0	6.3	23.1	6.7
Rocky Mountain:														
New Mexico	28	13.7	1.0	6.1	3.6	383	19	121	89	26	14.0	0.5	4.8	3.3
Other Rocky Mtn.	234	123.4	1.3	57.6	32.9	8,185	345	2,665	881	267	126.6	2.4	68.6	33.2
West Coast	1,064	456.3	8.3	134.0	279.4	28,484	358	13,415	29,365	1,144	496.2	5.7	164.2	382.5
Mar. 14, 1958	7,479	3,663.9	384.7	1,698.7	1,023.0	216,525	17,459	81,853	55,061	8,047	3,743.1	332.5	1,860.6	1,204.9
Mar. 7, 1958	7,488	3,613.4	413.7	1,733.7	1,143.0	215,419	17,622	84,018	54,803	.....	.....	.....	.....	.....
Mar. 15, 1957	8,098	3,726.3	343.0	1,949.4	1,218.1	205,589	19,701	79,599	36,283	.....	.....	.....	.....	.....

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

Crude-Oil and Refinery Prices at Representative U. S. and Foreign Points

REFINED-PRODUCT PRICES

Following quotations are for refinery products in cents per gallon moving in interstate shipments on Wednesday each week unless otherwise noted. Crude-oil prices are per barrel at the wells unless otherwise listed.

GASOLINE*

Mid-Continent (Group 3):	
★ Regular (89 octane)	11.00-11.50
★ Premium (98 octane)	13.75-14.25
Gulf Coast (cargoes for coastwise or export movements):	
Regular (90 octane)	9.75-10.25
Regular (92 octane)	10.00-10.50
Premium (97 octane)	11.50-12.00
Premium (98 octane)	11.75-12.50
California (rack) (Los Angeles):	
Regular (88 octane)	12.0
Premium (96 octane)	14.5
Premium (98 octane)	15.0
Caribbean area (cargoes):	
Regular (87 octane)	9.625-9.875
Premium (93 octane)	10.50-10.75

*Quotations are for octanes shown. Prices usually vary with octane ratings within the regular, premium, and aviation grades.

NATURAL GASOLINE*

Group 3:	
Grade 26-70	4.5
Breckenridge:	
Grade 26-70	4.0

*If 26-70 natural is considered as 100 per cent, prices for lower-vapor-pressure grades increase 2.5 per cent for each unit drop in Reid vapor pressure down to and including 16 lb. Prices for grades below 16 lb. may vary slightly by areas or plants.

KEROSINE AND DISTILLATE

Mid-Continent (Group 3):	
★ Kerosine 42-44	9.25-9.50
★ Diesel oil (58 d.i. and above)	8.875-9.125
★ Distillate No. 1	8.875-9.125
★ Distillate No. 2	8.25-8.50
Gulf Coast (cargoes):	
★ Kerosine 41-43	8.625-8.75
Distillate No. 2	8.125-8.375
New York Harbor (barges):	
Kerosine 41-43	9.65
Distillate No. 2	9.15
Diesel fuel, 48-52 d.i.	9.75
Caribbean area (cargoes):	
★ Distillate No. 2	8.125

WAX (LB.)

Oklahoma (Group 3):	
132-135 A.m.p. (semi-refined) in tank cars	6.50
New York (export):	
126-130 A.m.p. crude-scale (solid in bags or barrels)	7.35

★Denotes change from previous week.

RESIDUAL FUEL (BBL.)

Mid-Continent (Group 3):	
Residual fuel (max. 1% S)	$1.20-1.30
Gulf Coast (cargoes):	
Bunker C fuel	$2.25-2.40
New York Harbor (barges):	
Bunker C fuel	$2.65
Caribbean (cargoes):	
Bunker C	$2.25
California (rack):	
Bunker C fuel, Los Angeles	$2.65-2.80

LUBRICATING OILS

Mid-Continent (Group 3):	
150-160 bright stock, solvent refined, 0-10 p.p., 95 v.i.	23.0
200 vis. neutral oil, solvent refined, 0-10 p.p., 95 v.i.	20.5
Pennsylvania Grade:	
145-155 vis. at 210, bright stock, 8 color, 25 p.t.	26
200 vis. neutral (180° at 100°), 25 p.t.	24

CRUDE-OIL PRICES

GRAVITY SCHEDULE

	Signal Hill, Calif.	Mid-Cont.*	Gulf Coast Tex.†	West Tex.‡ N.M.	Wyo. (sour) (§)
14-14.9	$2.67	....	....	....	....
15-15.9	2.71	....	....	....	$1.81
16-16.9	2.74	....	....	....	1.86
17-17.9	2.78	....	....	....	1.91
18-18.9	2.82	....	....	....	1.96
19-19.9	2.85	....	....	....	2.01
20-20.9	2.89	$2.75	....	$2.62	2.06
21-21.9	2.93	2.77	....	2.64	2.11
22-22.9	2.97	2.79	....	2.66	2.16
23-23.9	3.01	2.81	$3.44	2.68	2.21
24-24.9	3.05	2.83	3.46	2.70	2.26
25-25.9	3.09	2.85	3.48	2.72	2.31
26-26.9	3.13	2.87	3.50	2.74	2.36
27-27.9	3.17	2.89	3.52	2.76	2.49
28-28.9	3.22	2.91	3.54	2.78	2.54
29-29.9	3.27	2.93	3.56	2.80	2.59
30-30.9	3.32	2.95	....	2.82	2.63
31-31.9	3.38	2.97	....	2.84	2.67
32-32.9	3.44	2.99	....	2.86	2.71
33-33.9	3.50	3.01	....	2.88	2.75
34-34.9	3.56	3.03	....	2.90	2.79
35-35.9	3.61	3.05	....	2.92	2.83
36-36.9	3.65	3.07	....	2.94	2.87
37-37.9	3.68	3.09	....	2.96	2.89
38-38.9	....	3.11	....	2.98	2.91
39-39.9	....	3.13	....	3.00	2.93
40 and up	....	3.15	....	3.02	2.95

*Includes Oklahoma, part of Kansas, North Dakota, West Texas (sweet) and North Central Texas. †Low cold test Gulf Coast. ‡Sour. §Some heavy Wyoming sour posted at 8 cents less.

Effective dates: California January 17, 1957, east of California, January 3-January 10, 1957; Pennsylvania Grade, Feb. 3, 1958.

FLAT PRICES

Louisiana:	
Bienville (distillate)	$3.05
Ville Platte	3.45
Texas:	
East Texas	3.25
Conroe	3.53
Van	3.08
Pennsylvania Grade:	
Bradford	4.40
Middle District	4.22
Southwest Pennsylvania	3.93
West Virginia	3.75
Buckeye Grade	3.75
Illinois Basin	3.00
Canada:	
Leduc-Woodbend	2.74
Redwater (Alta.)	2.63
Smiley (Sask.)	2.40
Pembina	2.61

FOREIGN

Venezuela:	
Cumarebo, 48°-49.9°, Tucupido	3.75
San Joaquin, 41°-41.9°, Puerto La Cruz	3.34
Oficina, 35°-35.9°, Puerto La Cruz	3.05
Tia Juana medium, 26.5°-26.9°, Amuay*	2.55
Quiriquire, 16.5°-16.9°, Caripito	2.45
Lagunillas heavy, flat, Amuay or Las Piedras*	2.25-2.38
Bachaquero, flat, Las Piedras*	2.03-2.23

Prices for all crudes of 24° or lighter vary 2 cents per degree change, up or down. All crudes heavier than 24° vary 2.5 cents per half-degree gravity change.

*Also available at La Salina at 3 cents per barrel less.

Middle East, Persian Gulf (cargoes, f.o.b. lifting port):	
Arabian, 36.0°-36.9°, Ras Tanura	$2.12
Iranian, 34.0°-34.9°, Bandar Masur	2.04
Iranian, 34.0°-34.9°, Abadan	1.99
Iraq, 35.0°-35.9°, Fao	1.98
Kuwait, 31.0°-31.9°, Mina-al-Ahmadi	1.85
Qatar, 41.0°-41.9, Umm Said	2.23
Middle East, E. Mediterranean:	
Arabian, 36.0°-36.9°, Sidon	2.49
Iraq, 36.0°-36.9°, Tripoli, Banias	2.49
Far East (cargoes, f.o.b. Lutong, Sarawak):	
Seria Light, 37°	2.75

TANKER RATES PER LONG TON

(Latest reported spot fixtures)

★ Gulf-U.S.N.H., clean (USMC—30%)	$2.00
★ Carib.-U.K., clean (USMC—30%)	4.59
★ P.G.-U.K., clean (USMC—35%)	7.09
★ P.G.-U.S.N.H., dirty (USMC—62.5%)	4.76

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IMMEDIATE DELIVERY Indiana, Pa., 1775'—5½" Drill Pipe, 21.90#, Grade D, Range 2, Internal Upset Reed Super Shrink Joints, drilled 1200'. Simpson Drilling Co., P. O. Box 372, Indiana, Pa., Phone: 5-5575.

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36-L BUCYRUS SPUDDER on skids or trailer mounted. Near Chicago. Excellent condition. Butane and gas. Phone 498-J, J. M. Berry, Skiatook, Oklahoma.

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1—Guiberson Type E-1 Drilling Control Head with 10¾" union. Price $1700.
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4½"	F-25, 9.5# LW	52,000'
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24" x 45', 24 Tray
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24" x 42', 22 Tray, 230# T-304SS
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Valves: Steel & SS ⅛" through 6"
Furnaces: Petro-Chem, ½, ¾ mil. BTU-HR.

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Steel Tube: 1000, 900, 650, 500, 300, 200 sq. ft.
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S.S. Tube: 1223, 947, 570, 536, 380, 315, 250, 157 sq. ft.
4-6% Chr. Tube: 1000, 500 sq. ft.
Fin Tube: 73, 21, 11 sq. ft.

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Hot-Oil: 324 gpm @ 4600'; 735 gpm @ 3100'; 400 gpm @ 2000'; 1270 gpm @ 408'.
Water: 10,500 gpm @ 135'

COMPRESSORS

Worth.: LTC-6, Gas Engine, 800 hp.
Penna.: 100 CFM @ 500#; 385 CFM @ 160#

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PEABODY Direct Fired Air Heater, 10,000 SCFM.

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8'0" x 75'0" 25 PSI 4 Baffle & 22 Bubble Cap Trays
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3'0" x 45'0" 260 PSI Packed
3'0" x 32'0" 40 PSI 8 Bubble Cap St Steel Trays
3'0" x 23'6" 600 PSI Packed
2'6" x 77'6" 275 PSI 32 Bubble Cap St Steel Trays
2'6" x 43'6" 180 PSI 24 Bubble Cap Trays
2'6" x 30'0" 270 PSI Packed

REGENERATION AIR BLOWER, 11,000 CFM, 11 PSIG, Turbine Driven.

REBOILERS

All Steel U-Tube Bundles, Sq. Ft. Area: 947; 705; 220; 165.

POMONA PUMPS

GPM	PRESSURE	DRIVE
2600	75 PSI	200 HP Motor
2600	75 PSI	160 HP Turbine
1550	75 PSI	125 HP Motor (2)
680	65 PSI	40 HP Motor

COOLING TOWER FLUOR INDUCED DRAFT, 6750 GPM, Three Cell Unit.

HEAT EXCHANGERS - CONDENSERS

Steel Tube (8) 170, 705, 880, 1080, 1500 Sq. Ft.
Adm. Tube (18) 331, 540, 705, 948, 1080, 1750 Sq. Ft.
CUPRO-NICKEL Monel Clad Shell 1495 Sq. Ft. (6)
BROWN FINTUBE, Steel Shells & Tubes 600 PSI 600° F. 68 from 92 to 158 Sq. Ft.

BLOW DOWN DRUM & STACK, 8'0" ID x 17'0", STACK 18" Dia. x 110" High.

KILN 18'-6¼" ID x 55'8" OA

BYRON JACKSON CENTRIFUGAL PUMPS
1 Motor & 1 Turbine Driven

(4) 1½" x 2" Two Stage (8) 2" x 3" (4) 3" x 4"
(4) 1½" x 2½" Two Stage (2) 4" x 6"

REACTOR, Stainless Steel Lined, 14'0" ID x 44'2" OA

DUPLEX & SIMPLEX STEAM PUMPS

12 x 5 x 12 (2)
8 x 4½ x 12 (2)
8 x 4 x 6 (5)
7½ x 4 x 10 (2)
6 x 4 x 6 (5)
4½ x 4 x 6 (1)
Hot Oil 6 x 4 x 6 (3)

INSTRUMENTS, complete instrumentation for control of all steps in process—Write for complete list.

PASSENGER ELEVATOR—Otis Electric 6' x 6', Travel 182'6" 10 Opening stops same side. Rate of Travel 300 FPM, Capacity 2500 lbs.

OTHER MODERN EQUIPMENT OFFERED AT TREMENDOUS SAVINGS,

PROPANE GAS DEHYDRATOR. 20,000 gals./day, Type EXHC SX Anders Fully Automatic dual tower.

AGITATOR TANK. 50,000 gal. capacity.

ETHYL BLENDING PLANT, 8,500 gallon—60 Ton Howe Weight-O-Graph.
HARDINGE CLASSIFIER.

FURNACE TUBES—4" x ⅝" x 24'8"—Croloy 5, NEW; 4½" x ⅞" x 29'6"—Croloy 5, USED; 5" x ¾" x 19'6"—Croloy 5, USED.

750 Ton Good Used Steel Pipe, 2" to 18".

200 Ton Flanges, Fittings, Valves, Steel & Cast Iron, Used.

1000 Ton Tank Plate, ¼" to ⅞", Used.

LARGE QUANTITY of Explosion Proof Motors, Electric Starters & Fittings.

AUTOMATIC TELEPHONE EQUIPMENT, Kellogg Cordless PBX—100 Circuit Switch Board, complete with 100 Telephones.

STORAGE & RUN DOWN TANKS

WELDED	RIVETED
80,000 bbl. Floating Roof	55,000 bbl. Cone (2)
80,000 bbl. Open	10,000 bbl. Cone (2)
10,000 bbl. Flat Roof	5,000 bbl. Cone (2)
5,000 bbl. Cone (3)	2,500 bbl. Cone
1,800 bbl. Cone (2)	1,800 bbl. Cone (12)
1,500 bbl. Cone (2)	1,500 bbl. Cone (2)
	1,000 bbl. Cone (6)

10,000 Bbl. Welded HORTON SPHEROID

HEAT & POWER CO., INC.

60 East 42nd St., New York 17, N. Y., MUrray Hill 7-5280
310 Thompson Bldg., Tulsa 3, Oklahoma. Diamond 3-4890
SITE OFFICE—Drumright, Okla., Phone 569

DOUBLE MAST Pole Rotary Rig 100 Horsepower International Motor—$3,000.00. Call CEntral 2-6318, Oklahoma City.

WALKER-NEER SPUDDER—Model S-43. New Lines, 5" and 6" tools. Complete equipment for completion work.—Bandy Drilling Company, Cushing, Oklahoma.

1 36L BUCYRUS Spudder complete with 5 and 7 inch tailing in tools. Dog house, butane tank, junk rack and light plant. Rod and tubing tools and hand tools. Phone Office 144, Res. 614, Cleveland, Oklahoma.

1 GMC PERFORATING TRUCK, complete with Gamma Ray logging equipment. 20,000' line capacity. Perfect condition. Will sell with or without logging equipment and line. Box K-487, The Oil and Gas Journal, Tulsa, Oklahoma.

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EQUIPMENT WANTED

SMALL BLOWOUT PREVENTER. Small Drill Collars. R. B. Beckman, c/o Hudson Hotel, Oklahoma City, Oklahoma.

12-900 HYDRIL TYPE "GK" Blowout Preventer and Accumulator. Advise condition and bottom cash price on either or both. Box K-566, The Oil and Gas Journal, Tulsa, Oklahoma.

USED AMERADA RPG-3 or Humble Type Bottom Hole Pressure Instruments; also Dead Weight Testers. General Well Testing Co., 1206 Beck Bldg., Shreveport, La.

HELP WANTED

PETROLEUM ENGINEER. Expanding Independent Company has immediate opening for Petroleum Engineer to take over secondary recovery operations. Must be experienced and capable of assuming full responsibility for lay-out of well system, plant design, drilling and completion of wells and operation of water flood. Must have a practical approach to problems based on actual experience. Location Southwest. Arrangements will be made for interview. Box K-592, The Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED

FOREIGN EMPLOYMENT. List oil companies, drilling contractors, seismograph contractors, showing where apply foreign jobs, $5.00 cash. OIML Co., Box 2603, Tulsa, Okla.

WANTED—ENGINEERS

We are interested in employing Mechanical or Petroleum Engineers, preferably with a practical oil field background, including rotary or workover rig experience. Men in their twenties preferred; should be under age of 35.

BAKER OIL TOOLS, INC.

P. O. Box 3048
HOUSTON 1, TEXAS

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Middle East independent producer has opening for refinery superintendent with 10 to 15 years experience to supervise operation and maintenance new 30,000 BPD plant. Individual selected should be between 35-50 with ability coordinate American and foreign personnel. Resume and details should be addressed:

Box K-571,
The Oil and Gas Journal,
Tulsa, Oklahoma.

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Detroit research laboratories has opening in statistical planning group. Requires person with MS or PhD. degree in statistics and two to five years' industrial experience in engineering, chemical or physical applications. Principal duties involve the planning and analysis of experimental work of a diverse nature encountered in our automotive and chemical research laboratories. The data are often characterized by high variability and high cost. A small digital computer is available to the group. For more particulars write to:

PERSONNEL MANAGER
Ethyl Corporation Research Laboratories
1600 W. Eight Mile Road
Ferndale 20, Michigan

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- H. S. Graduate
- Age—to 45 years
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Salaries and allowances commensurate with background & qualifications (to $17,500). Liberal employee benefits and vacations.

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California Texas Oil Company, Ltd.

380 MADISON AVE. NEW YORK 17, N. Y.
ATTENTION: EMPLOYMENT SECTION

PETROLEUM CHEMIST — Mid-Continent area refinery has immediate opening for Petroleum Chemist with degree and experience in analysis of petroleum products. Send resume and salary requirements. Box K-603, The Oil and Gas Journal, Tulsa, Oklahoma.

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Product: insulated panels for crude oil storage tanks. East Coast and Tulsa representatives needed. Straight commission. Many existing major oil company customers. Reply—Universal Fabricated Products Co. 80 East Jackson Blvd. Chicago 4, Ill., Attention: W. Waite.

WANTED: Assistant Sales Manager for progressive oilfield tank manufacturer in Mid-Continent area. Applicant must be experienced in production equipment such as high pressure separators, oil treater, etc. Many company benefits. Top salary offered to qualified man. State qualifications in letter to Box K-618, The Oil and Gas Journal, Tulsa, Oklahoma.

MANUFACTURERS Representative for proven line of engine protective equipment. Several territories open. Box K-573, The Oil and Gas Journal, Tulsa, Oklahoma.

ACCOUNTANT—Independent Oil Operator located in Illinois needs an accountant familiar with all aspects of an operating company. In reply give summary of education, experience, salary expected and date available. Write Athene Development Co., Inc., P. O. Box 54, Champaign, Illinois.

SALESMAN to sell established line of Oil Field Specialties in North Texas area. Replies confidential. Box K-619, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCTION CLERK
for aggressive growing independent operating in 7 states to handle production records, production curves, code invoices, make material purchases, inventory properties and set up material records, file all state forms, set up production cost records, make monthly operational report. Must have enough production experience to recognize production and operational problems. Will work with experienced engineer. Give detailed educational and work record and salary expected.

Box K-610, The Oil and Gas Journal, Tulsa, Oklahoma.

To an Outstanding Drilling-Production Engineer . . .

Mail in confidence to:
The Oil and Gas Journal—Engineering Dept.
P. O. Box 1260—Tulsa 1, Okla.

I am interested in your drilling-production position in Tulsa, and am mailing an experience resume.

Name.....

Address.....

City..... State.....

WE'D like to offer you an unusual opportunity to prove your ability, advance in your career, and make a significant contribution to petroleum engineering.

Specifically, there is a position open for a young engineer on the editorial staff of The Oil and Gas Journal as a drilling-production editor in our Tulsa office.

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Fast growing organization has openings for experienced engineers in the design of specialized surface and subsurface electric logging equipment. Engineers selected will form the personnel nucleus of a new company service to the petroleum industry. Excellent opportunity for men interested in an unlimited future both in advancement and remuneration. If interested, send resume to

Box K-604,
The Oil and Gas Journal,
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SITUATION WANTED

CONTACT MAN - SALES ENGINEER. Eighteen years experience including work in Venezuela, Trinidad, Peru, Colombia. Box K-591, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOPHYSICIST-GEOLOGIST: Six years Rocky Mountain, Gulf Coast and Mid-Continent in geologic and seismic interpretation (incl. compositing techniques, etc.), with major company. Geophysical Degree, PC & Review experience. Box K-607, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATION WANTED

GEOLOGIST - STRATIGRAPHER, twenty years experience Oklahoma, Texas, San Juan Basin. Geological Administrative Experience. Box K-596, The Oil and Gas Journal, Tulsa, Oklahoma.

SEISMOLOGIST, with Geology degree. 16 years with Majors in Rocky Mountain area, Saskatchewan, and Venezuela. Experience includes field work, Interpretation, Reviews, and Supervision. Presently employed, references available. Desire position in States or foreign. Box K-593, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER: 29, family, four years diversified experience oil and gas production, gas processing and transmission. Obtaining MBA degree in June, available late June. Desire Administrative position requiring Engineering knowledge with independent producer. Box K-589, The Oil and Gas Journal, Tulsa, Oklahoma.

GRADUATE PETROLEUM ENGINEER, 5½ years varied experience in drilling, mud, production and workovers. Four years spent overseas. Desire foreign or domestic position with opportunity. Box K-602, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMICAL ENGINEER. Twelve years experience major companies in design, construction and operation of gas processing plants, including pipeline facilities. Supervisory experience. Desire position in Texas with medium size company, independent or contractor. Box K-539, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST, 31, single, 5 years experience with a major oil company, desires position with an independent. Box K-617, The Oil and Gas Journal, Tulsa, Oklahoma.

SUBSURFACE GEOLOGIST, seven years diversified experience, desires position in Rocky Mountains or California, Oklahoma. Box K-615, The Oil and Gas Journal, Tulsa, Oklahoma.

ENGINEER-GEOLOGIST, presently with oil major desires position in fields of exploration, engineering, production or sales in administrative, co-ordinating, office management or fact-finding work which requires special drive and talent and gives opportunity for individual self-expression; 6 years varied experience in petroleum and mining exploration and production; experience in U. S., Canada, Australia, South America and North Africa; age 32, single; foreign work only on permanent or roving assignment; no objection to temporary employment in U. S. Box K-616, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED Petroleum Geologist—13 years varied exploration experience mostly on Gulf Coast. Want relocation to Rocky Mountain Area. Administration not necessary. Box K-613, The Oil and Gas Journal, Tulsa, Oklahoma.

FORMER MANAGER of independent with Large Gasoline Plant Production and Drilling Departments. Would like to work with Independent same capacity. Box K-612, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST—M.S., 32, Surface and subsurface experience. Presently in Development, Gulf Coast major; desire relocation U. S. or Europe. Box K-609, The Oil and Gas Journal, Tulsa, Oklahoma.

GRADUATE PETROLEUM ENGINEER with 15 years production—Secondary waterflooding experience desires position. Has installed and operated successful floods. Box K-614, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER, 31, family, B.S. degree in Petroleum Engineering from University of Texas, 6 years diversified experience in oil industry, 2 years Major Oil Co. West Texas, 1½ years with small Independent North Texas, 2½ years Self Employed as Consulting Petroleum Engineer North Texas. Thoroughly experienced in most phases of drilling, completions, workovers, waterflooding, dealing with regulatory bodies, property valuation, screening drilling prospects, subsurface mapping, and running of samples. Desires responsible position with Consulting firm or Producing Company. Box K-606, The Oil and Gas Journal, Tulsa, Oklahoma.

ECONOMIC ANALYST—Twelve years experience refinery operations integrated major. Desires comptrollership or equivalent responsible position progressive company. Supervisory experience. Business Management and Engineering Degrees. Box K-601, The Oil and Gas Journal, Tulsa, Oklahoma.

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Delaware Corporation formed and serviced. American Guaranty & Trust Company, P. O. Box 487, Wilmington, Delaware.

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FINANCIAL CONTACTS. Underwriters, Brokers, Private Finders of Capital reached. No shopping. Confidential. FREE ENTERPRISE ASSOCIATES, 817 51st St., Brooklyn, N. Y.

OAKS GREW from acorns! CONTROL good oil properties? READY drill? Need $100,000-$4,000,000? MAIL plans; facts; figures! GENERAL FINANCE; 1899 W. 25 #301, Cleveland, Ohio.

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WE WANT producing royalties, producing oil & gas properties, also farmouts gas acreage. Ben H. Williams — Clarendon, Texas.

HAVE EXCELLENT market for producing royalty. Prefer a developed or partially developed field. R. E. Clement, Box 65, Norman, Oklahoma.

LEASE AND DRILLING BLOCKS

WANTED—Proven or Semi-proven acreage to drill, prefer something above 4000'. Box K-611, The Oil and Gas Journal, Tulsa, Oklahoma.

WILL CHECKERBOARD—Have 1000 acres in good producing territory Licking County, Ohio. Possibility of 3 pay zones to 3000 ft. including Clinton sand. No proration in Ohio. Box K-608, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE—160-acre Producing lease depth 1200 to 2500 ft. More locations to drill. Bill Mashunkashey, Box 365, Pawhuska, Okla.

5000 ACRE Virgin Structure in Montana. Shallow Drilling. Need financial help to drill with my own tools. R. B. Beckman, c/o Hudson Hotel, Oklahoma City.

NOTICE OF SALE BY TRUSTEE IN DISSOLUTION OF CORPORATION OF PRODUCING ROYALTY INTERESTS IN CADDO COUNTY, OKLAHOMA.

NOTICE IS HEREBY GIVEN that on the 4th day of April, 1958, at the hour of 2:00 o'clock P.M., in the foyer of the Court House in the City of Alva, Woods County, Oklahoma, the undersigned will sell to the highest and best bidder for cash, subject to confirmation of the District Court of Woods County, Oklahoma, all of the right, title and interest of the Enid Drilling Company, dissolved, in and to the following mineral interests under the real estate described, which are now producing oil:

1. An Undivided 4/40ths mineral interest in and under the Northwest Quarter (NW¼) of the Southwest Quarter (SW¼) of Section Four (4), Township Five (5) North, Range Nine (9), W.I.M., Caddo County, Oklahoma.
2. An undivided 4/100ths mineral interest in and under the west Half (W½) of the Southeast Quarter (SE¼), and the West Half (W½) of the Southeast Quarter (SE¼) of the Southeast Quarter (SE¼), of Section Four (4), Township Five (5) North, Range Nine (9), W.I.M., Caddo County, Oklahoma.

The foregoing interests were adjudicated as being owned by said corporation by judgment in the case of W. L. Thatcher vs. Matie B. Glasgow, et al., No. 16,828, District Court of Caddo County, Oklahoma, on March 12th, 1954, and sale of such mineral interests is being made by the undersigned Trustee pursuant to Order of the District Court of Woods County, Oklahoma, entered January 15th, 1958, in The Matter of the Dissolution of the Enid Drilling Company, a Corporation, No. 10,748.

DATED February 19th, 1958.

JOHN B. DOOLIN, TRUSTEE

Office: Alva State Bank Building
Alva, Oklahoma.

OIL AND GAS LEASES FOR SALE
70,000 ACRES—ALASKA PENINSULA
Southwest of estimated billion barrel Richfield Swanson River field where $30,000,000.00 exploration and development under way. This acreage near Humble Bear Creek Prospect toward north end of Alaska Peninsula.
Box K-605, The Oil and Gas Journal, Tulsa, Oklahoma.

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STOCK RANCH FOR SALE IN MEXICO, situated on Mexico-Laredo Highway, 35 miles south of Ciudad Victoria, State of Tamaulipas. 400 head of Brahman-mixed cows. About 6,000 acres total—3,000 acres fertile grass and crop land good for corn and cotton. Good water and hunting on ranch. New 3,000 sq. ft. owner's stone house, corrals, and tenant houses. Write or phone **Parke Dickey, Owasso, Oklahoma, VErnon 2-5627.**

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WANTED
Production

We are interested in buying producing oil properties including those with possibilities of additional development.

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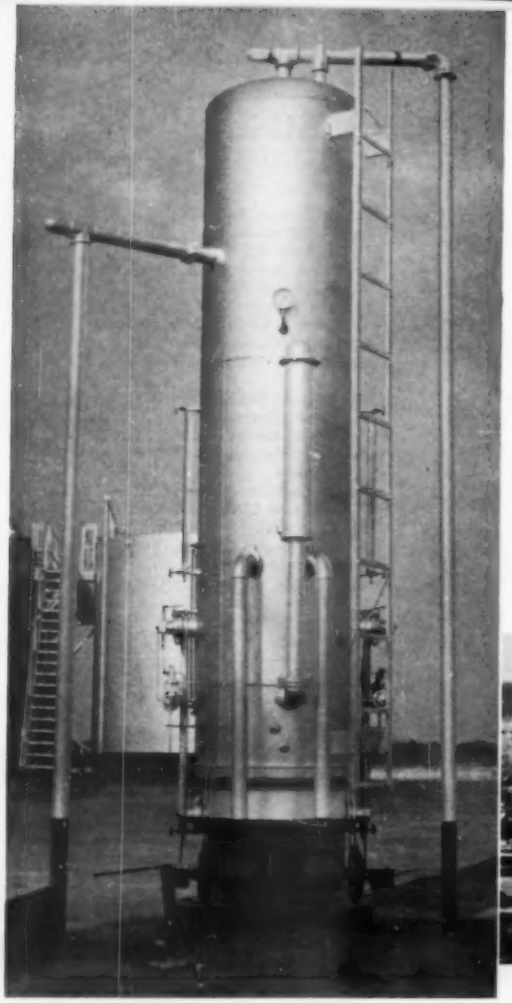
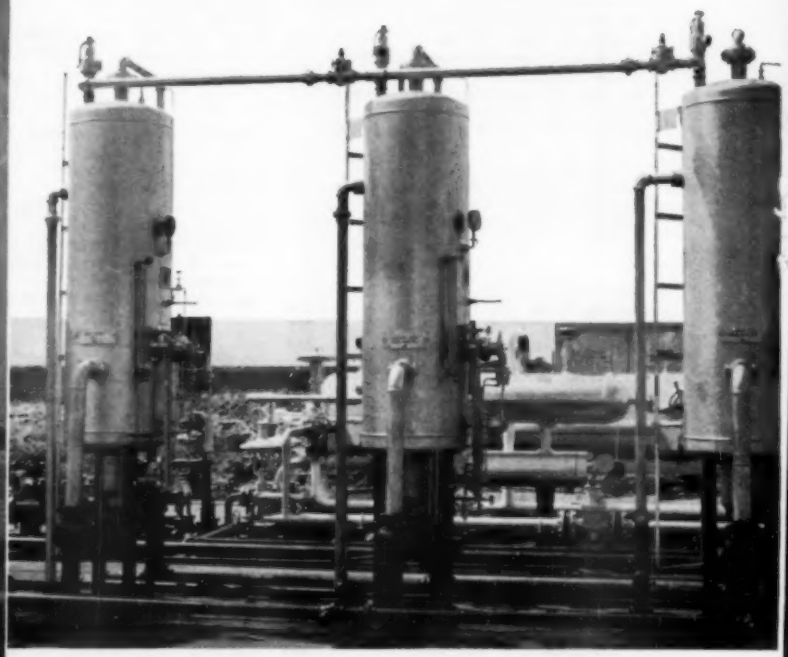


National Three - Phase (Oil - Gas - Water) Metering Separator in West Texas separating and measuring oil and water for individual well testing.



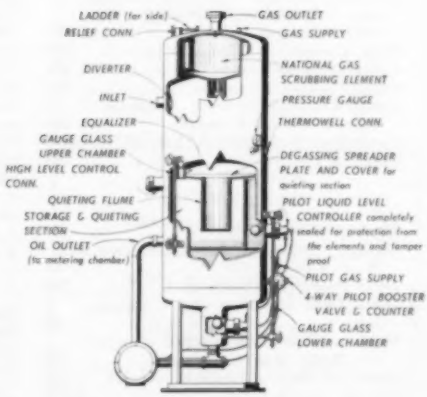
National Two-Phase (Oil-Gas) Metering Separators being used as LTX flash separators to measure distillate production from individual wells for commingling.

In The Separator Section

1. The long proven National Standard Gas Scrubbing Element assures liquid free gas.
2. A spreader plate insures degassing of the oil and provides the quieting section essential for efficient separation.
3. Ample storage of oil in a turbulent-free section provides stabilization and prevents carry-over during meter discharge period.

In The Liquid Metering Section

1. Reduced liquid surface area at both high and low level assures minimum metering error.
2. Two weather-proof, tamper-proof, sensitive level controls operating in conjunction with a power booster and custom designed three-way valve guarantee the ultimate in accuracy obtainable for a meter which isolates a volume between level control points.
3. Prefabricated piping furnished for ease and speed of installation.



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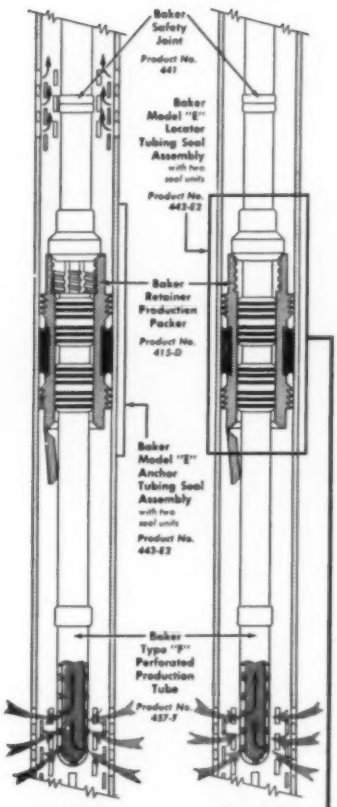
NATIONAL TANK COMPANY

TULSA, OKLAHOMA

SINGLE ZONE

DUAL ZONE
PRODUCTION

WITH **1** **BAKER**


Baker Safety Joint
Product No. 441
Baker Model "E" Locator Tubing Seal Assembly with two seal units
Product No. 443-52
Baker Retainer Production Packer
Product No. 415-D
Baker Model "E" Anchor Tubing Seal Assembly with two seal units
Product No. 443-52
Baker Type "P" Perforated Production Tube
Product No. 437-P

TYPICAL DUAL ZONE HOOKUP

TYPICAL SINGLE ZONE HOOKUP

Right: Picture shows actual detail of seal units

RETAINER PRODUCTION PACKER

Do you know that with only ONE Baker Retainer Production Packer you can equip your well for *either* SINGLE ZONE or DUAL ZONE production? And that you can accomplish *any* type of completion for *any* method of production to meet *fixed* or *changing* well conditions?

A single Baker Retainer Production Packer will also outperform many specialized tools when used as a TESTING PACKER • SQUEEZE PACKER • GAS LIFT PACKER • PERMANENT COMPLETION PACKER • WATER FLOOD PACKER • GAS INJECTION PACKER • CORROSION CONTROL PACKER • TUBING ANCHOR • ONE-WAY BRIDGE PLUG • PERMANENT BRIDGE PLUG.

Every production man should be familiar with the many operating advantages of this "Universal Type" Packer, which include . . .

WIRE LINE SETTING • SETTING UNDER HIGH PRESSURE • NO EXCESSIVE "SET-DOWN" WEIGHT OR TENSION • HOLDS PRESSURE FROM ABOVE OR BELOW • PACKS-OFF AND HOLDS UNDER HIGH BHT • RESISTS CORROSION • EASILY DRILLABLE.

Ask any Baker representative or office for complete details. There is no charge and no obligation for specific recon.mendations and completion planning advice available from Baker Technical Advisers. Why not be prepared for your next completion?

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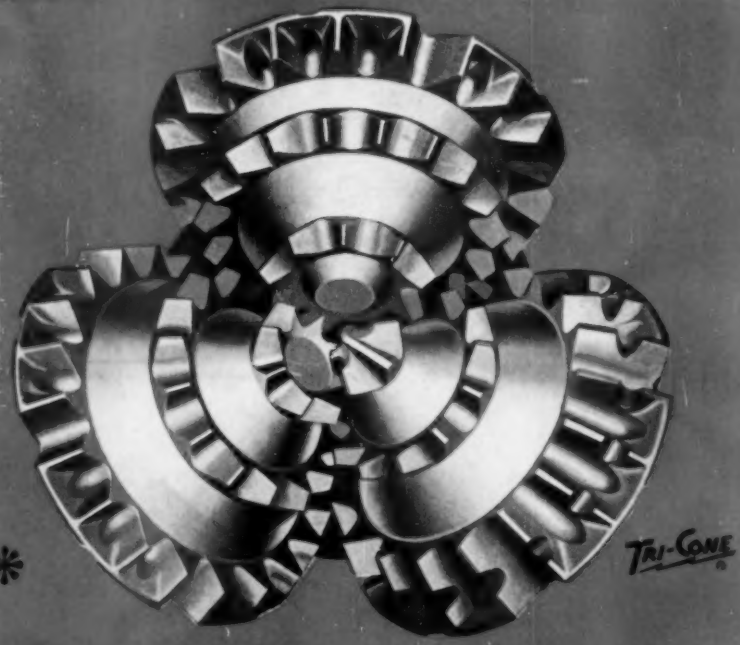
RETAINER PRODUCTION PACKER

If your well is worth completing . . . it's worth completing well



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* HUGHES W7R IS UNIVERSALLY USED TO DRILL HARD ABRASIVE FORMATIONS WHERE HOLDING GAGE IS A PROBLEM